

Title: TRACKABLE OPTICAL DISCS
WITH CONCURRENTLY READABLE
ANALYTE MATERIAL
Inventor: Mark O. Worthington
Docket No: BT11 98100804(US)USX1P1X1

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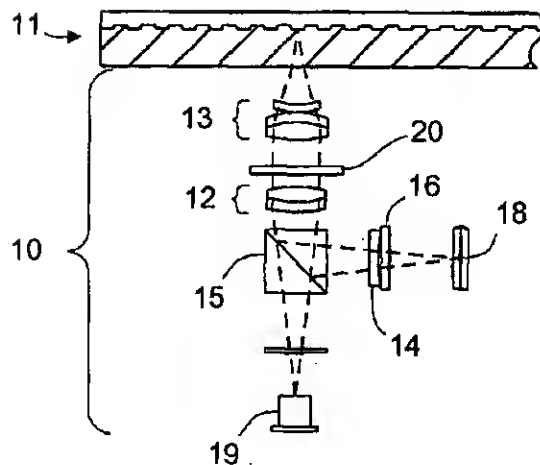
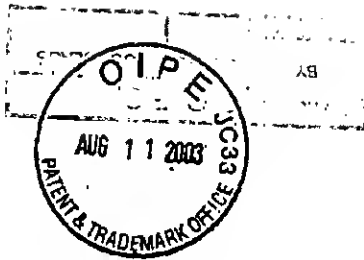


FIG. 1A

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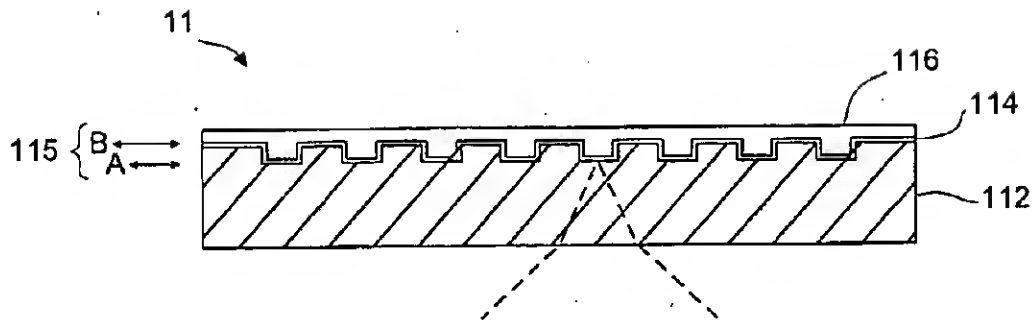


FIG. 1B

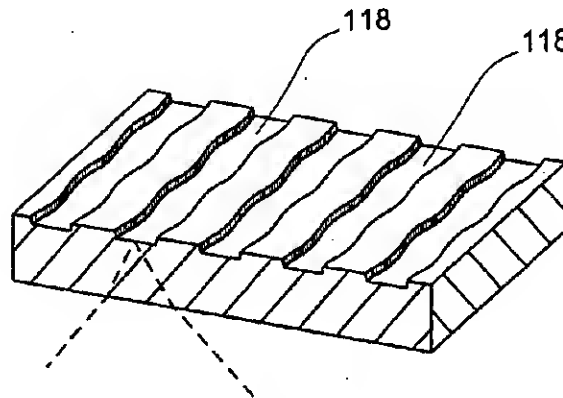


FIG. 1C

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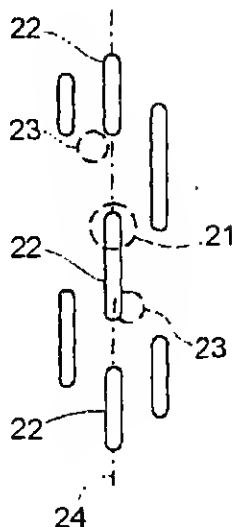


FIG. 2A

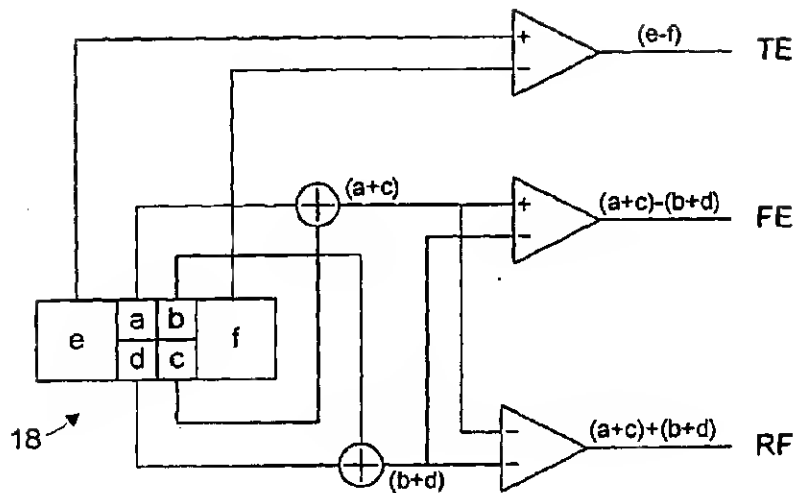


FIG. 2B

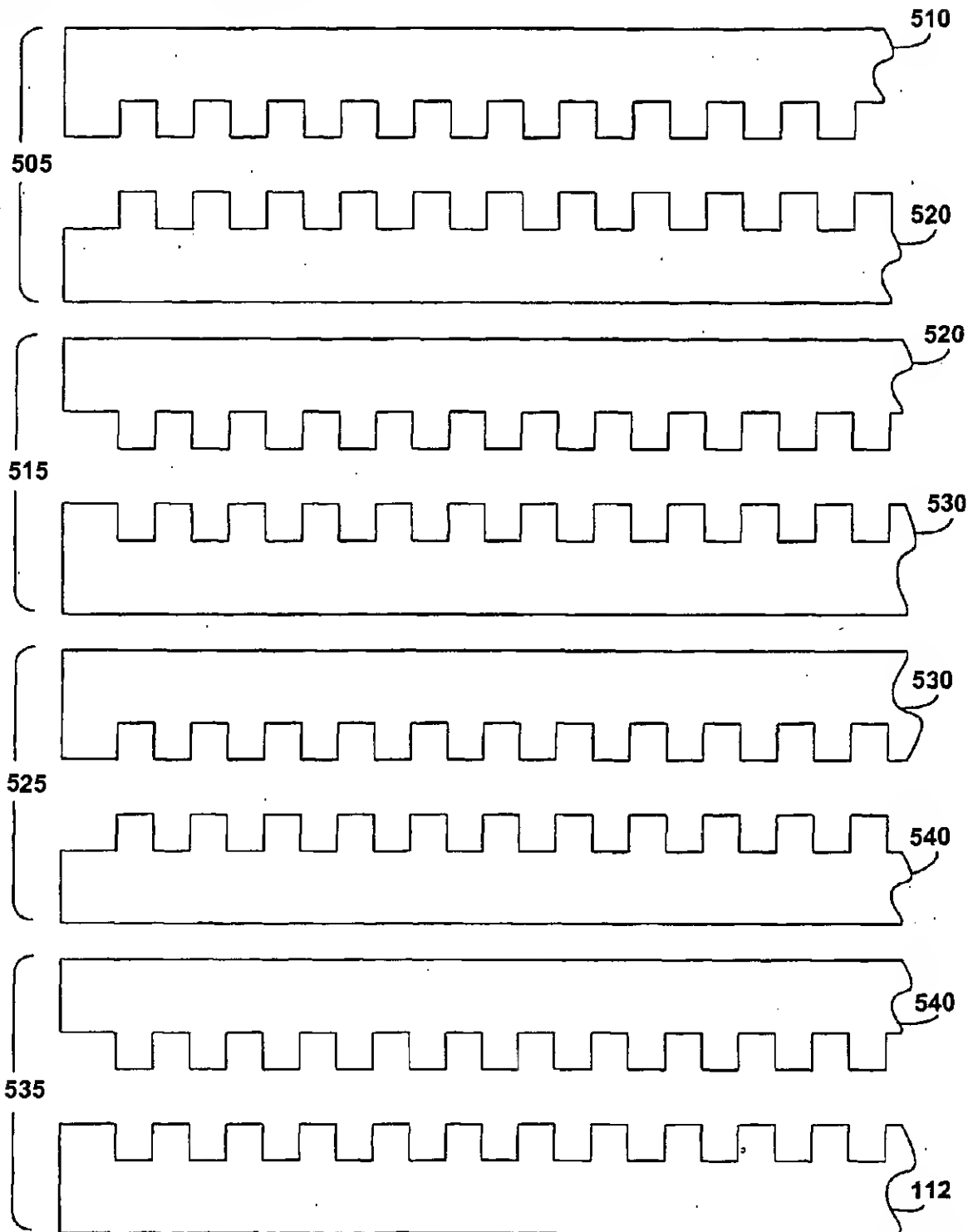
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FIG. 3A



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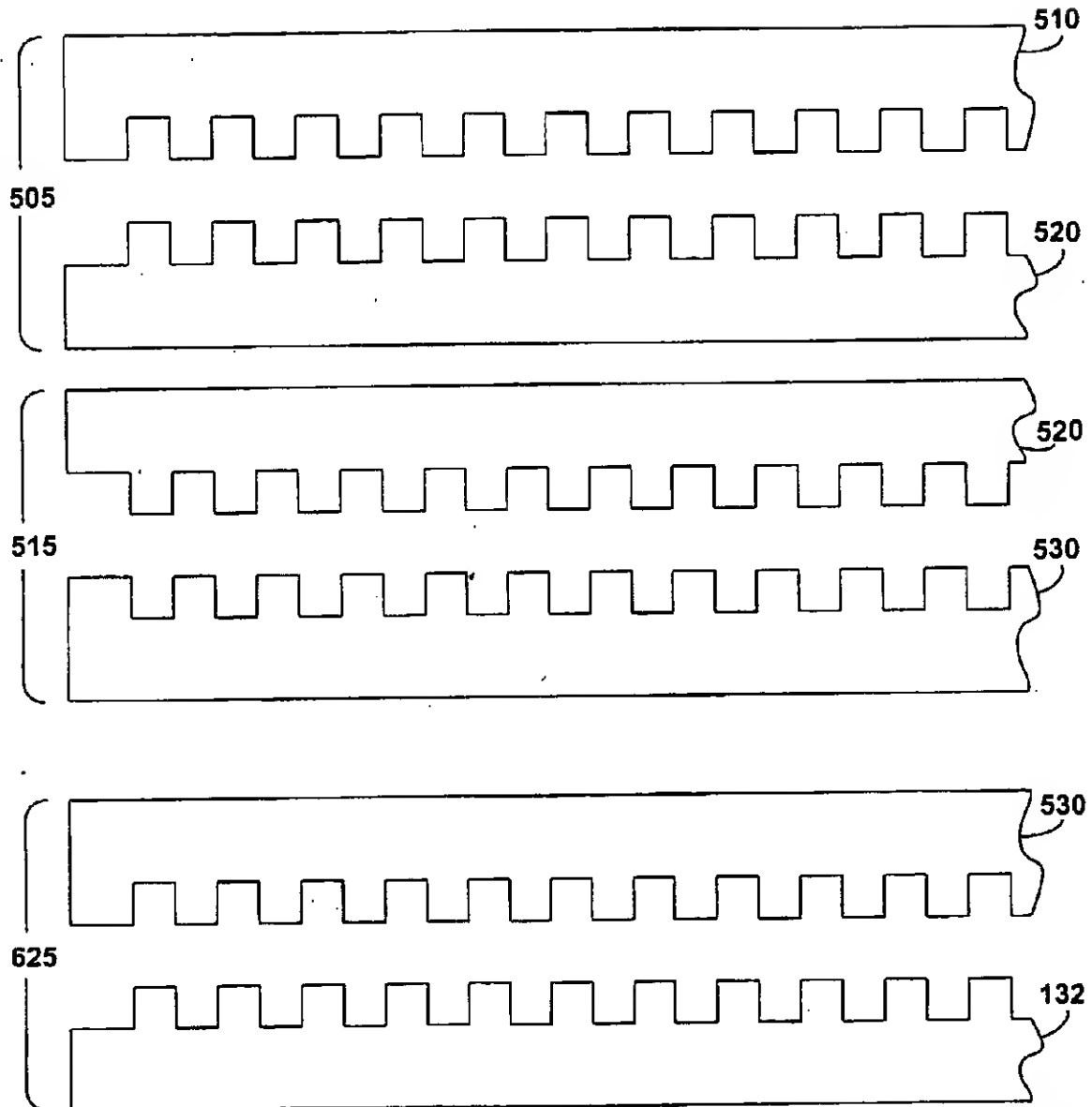
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FIG. 3B



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FIG. 3C

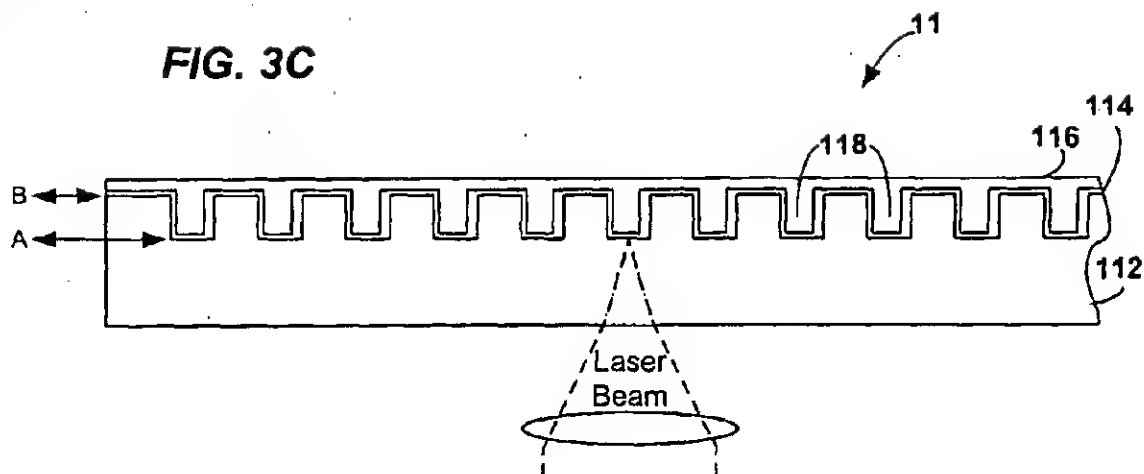


FIG. 3D

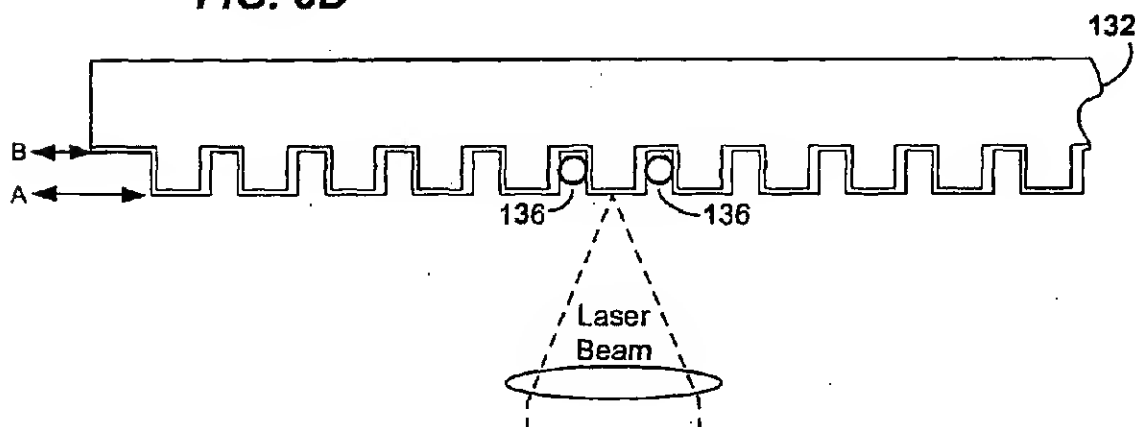
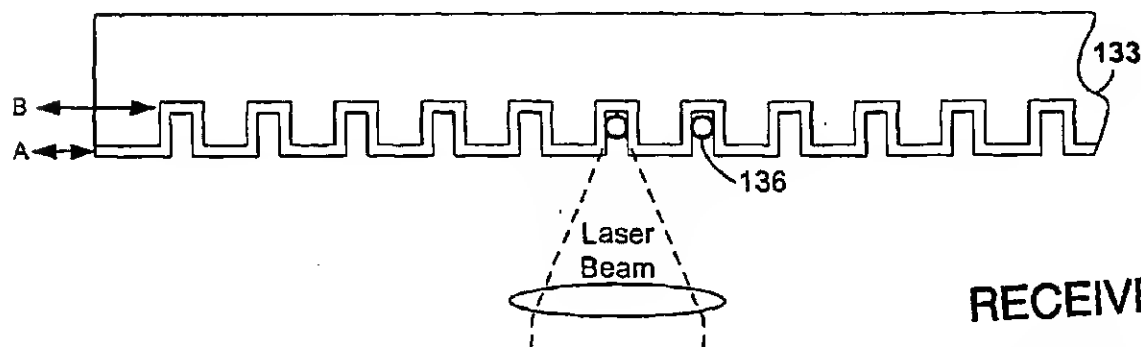


FIG. 3E



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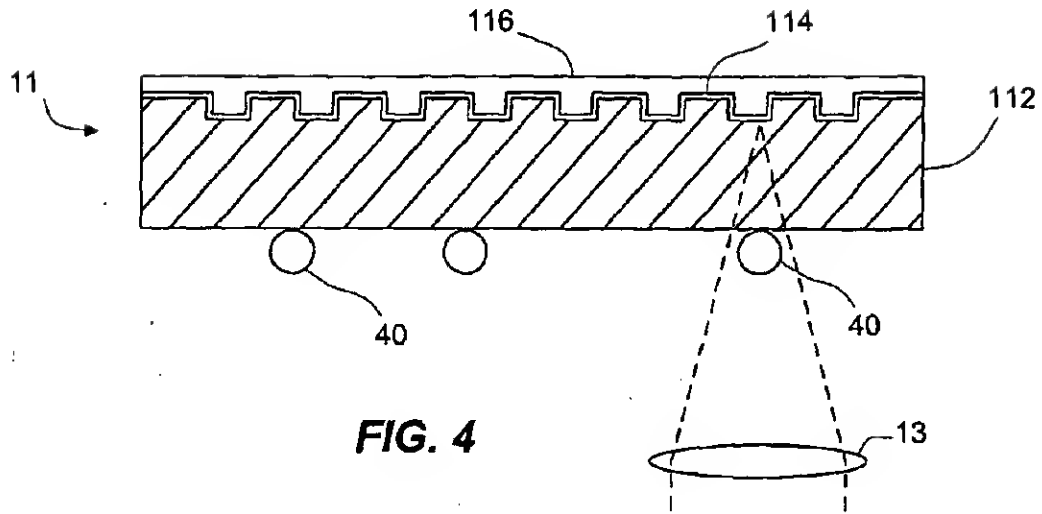


FIG. 4

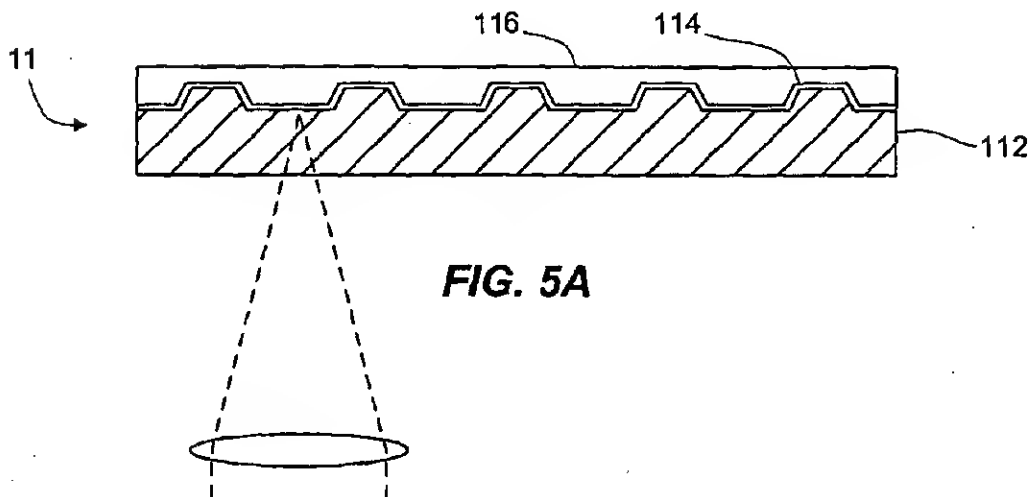


FIG. 5A

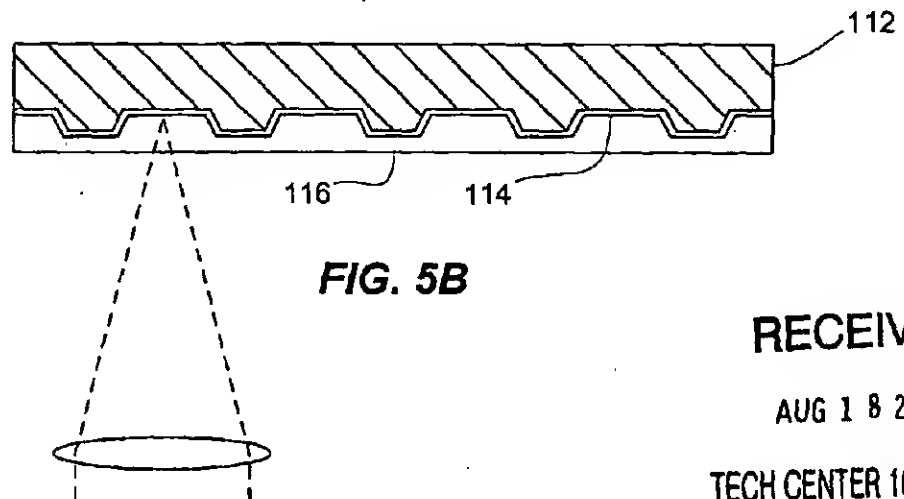


FIG. 5B

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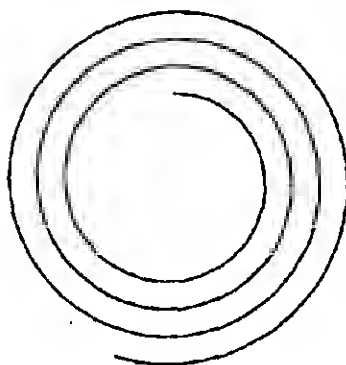


FIG. 5C

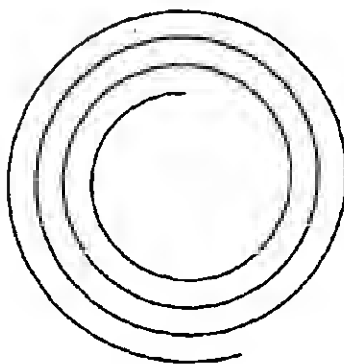


FIG. 5D

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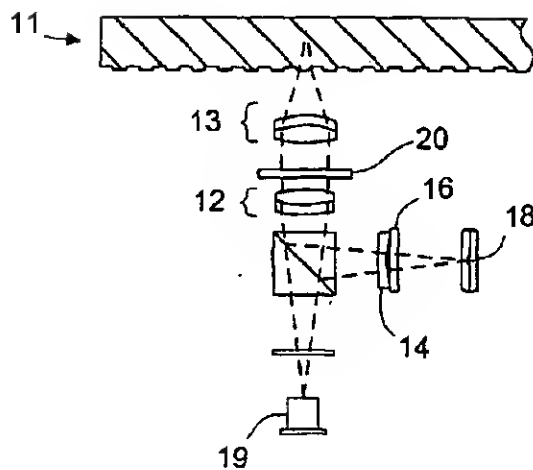


FIG. 6A

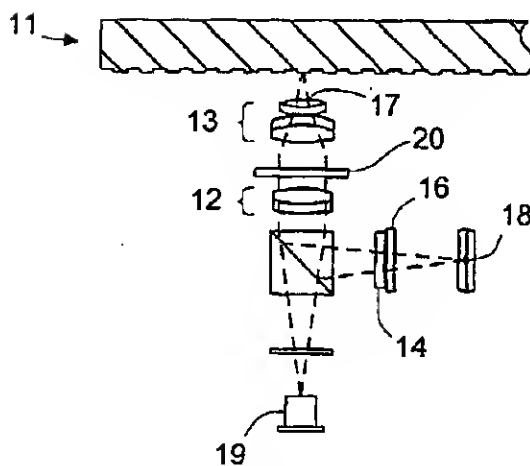


FIG. 6B

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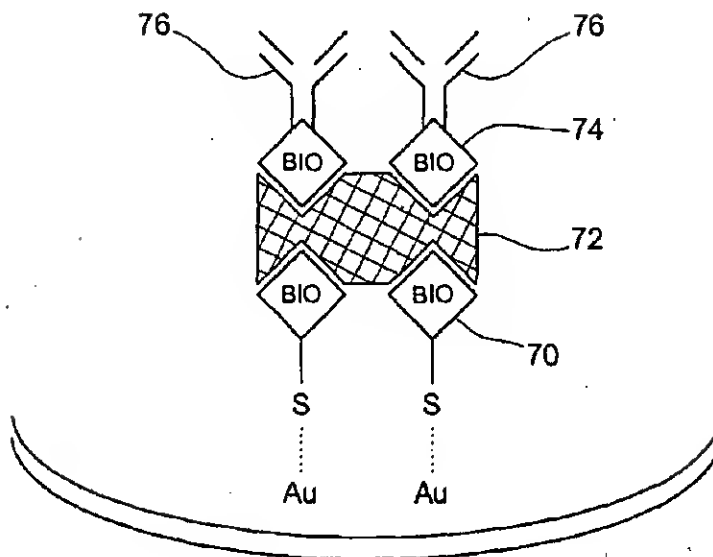


FIG. 7A

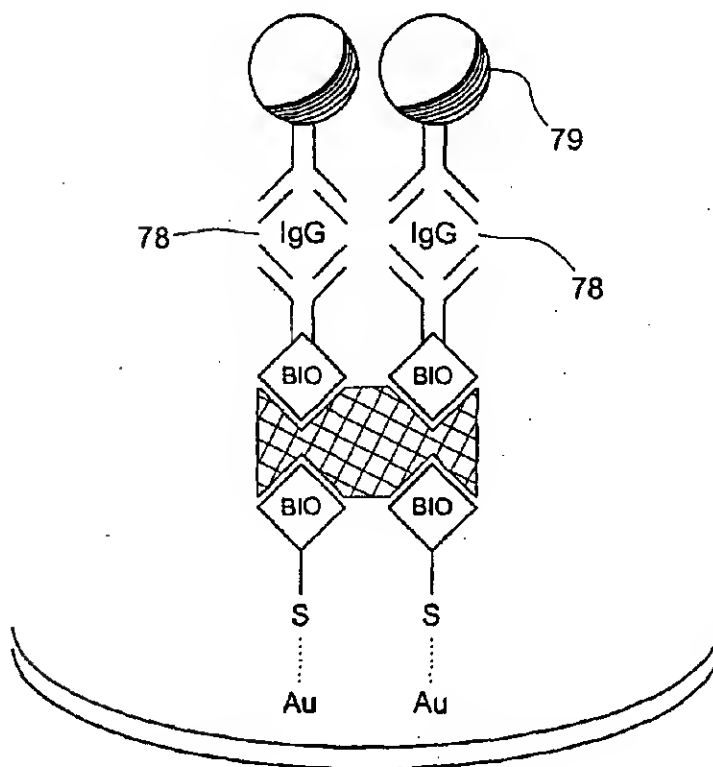


FIG. 7B

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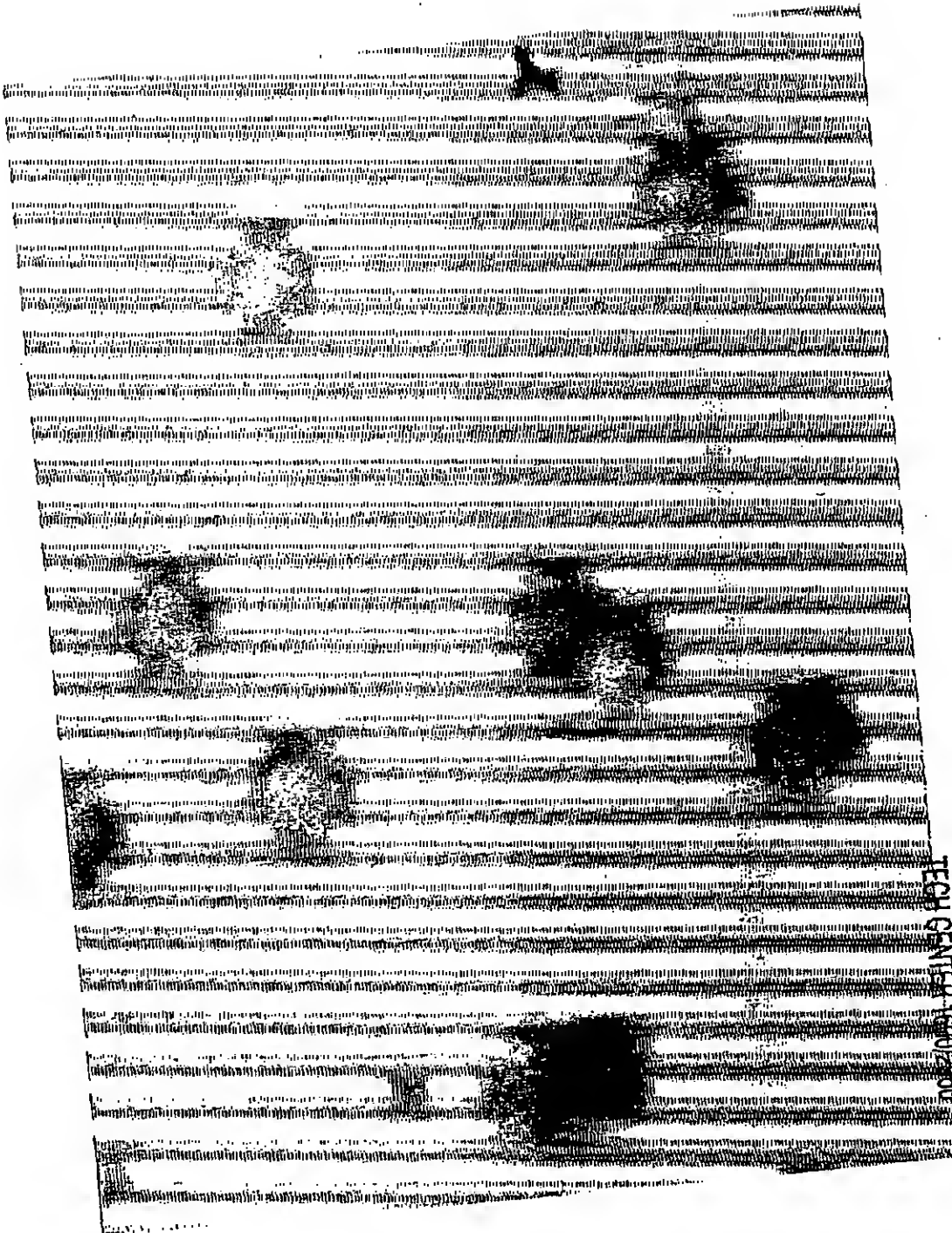
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FIG. 8



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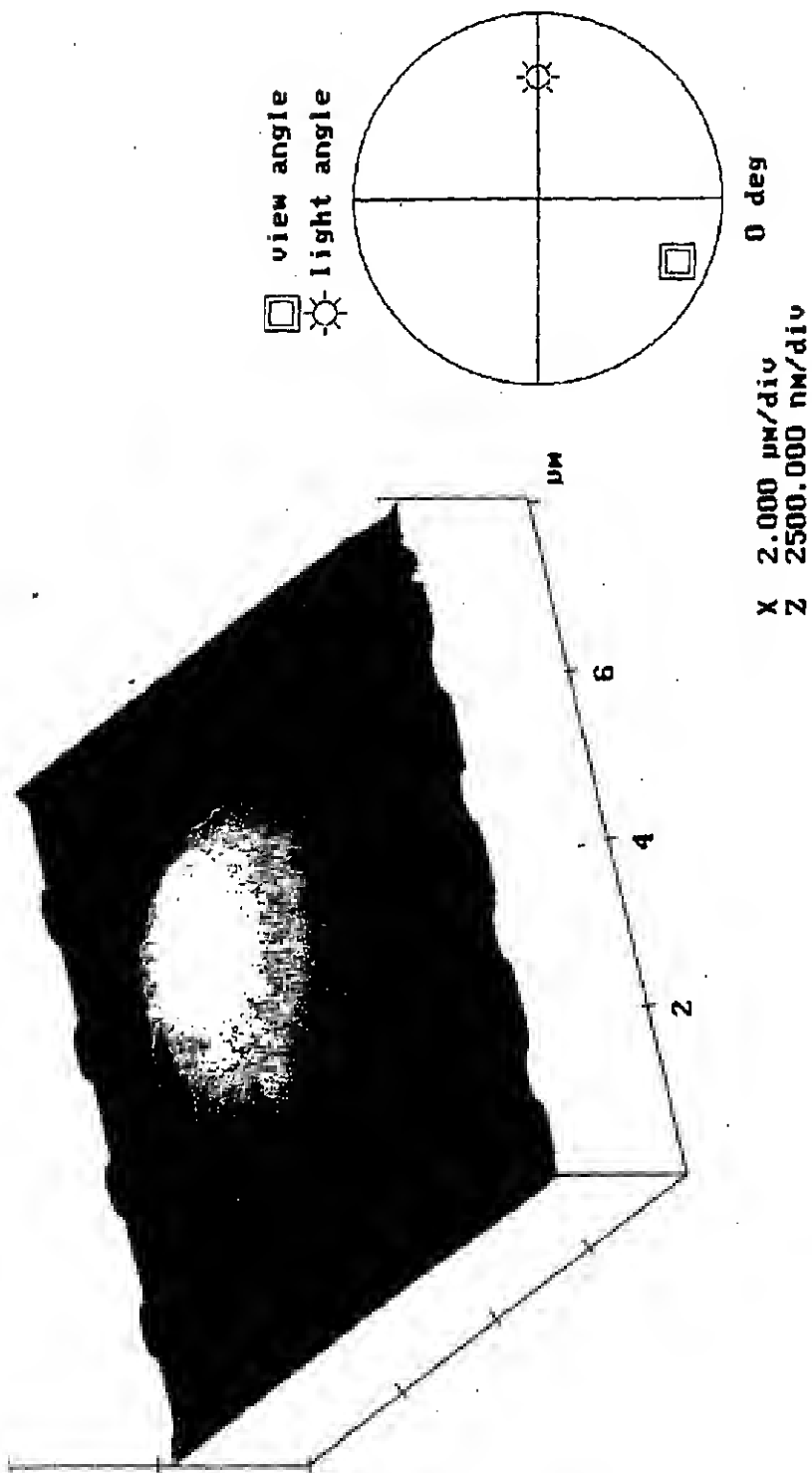
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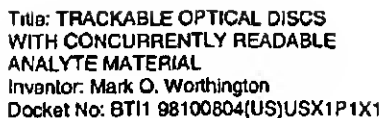
Sphere on Wobble Groove

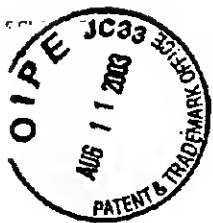
FIG. 9

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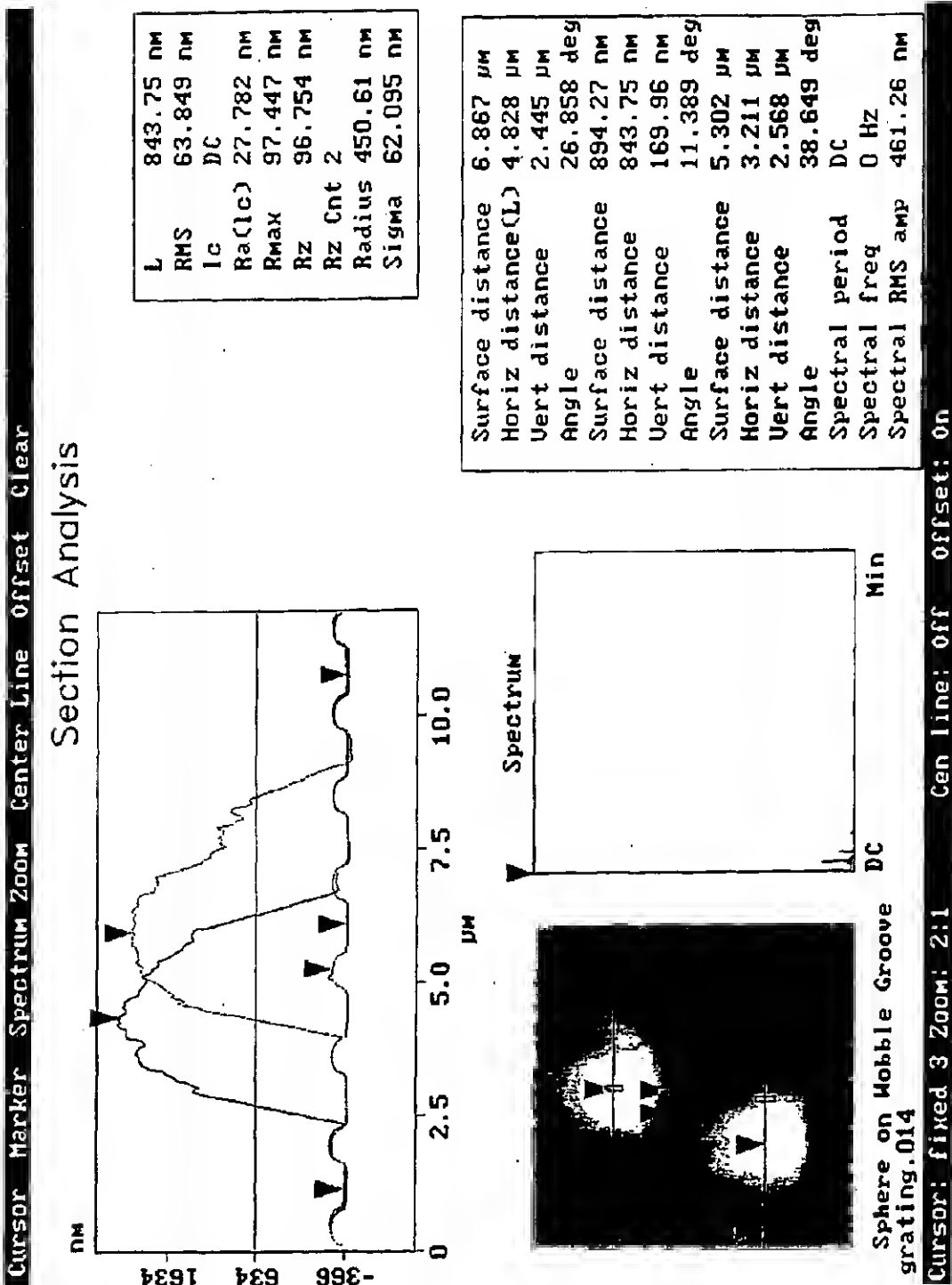




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FIG. 11



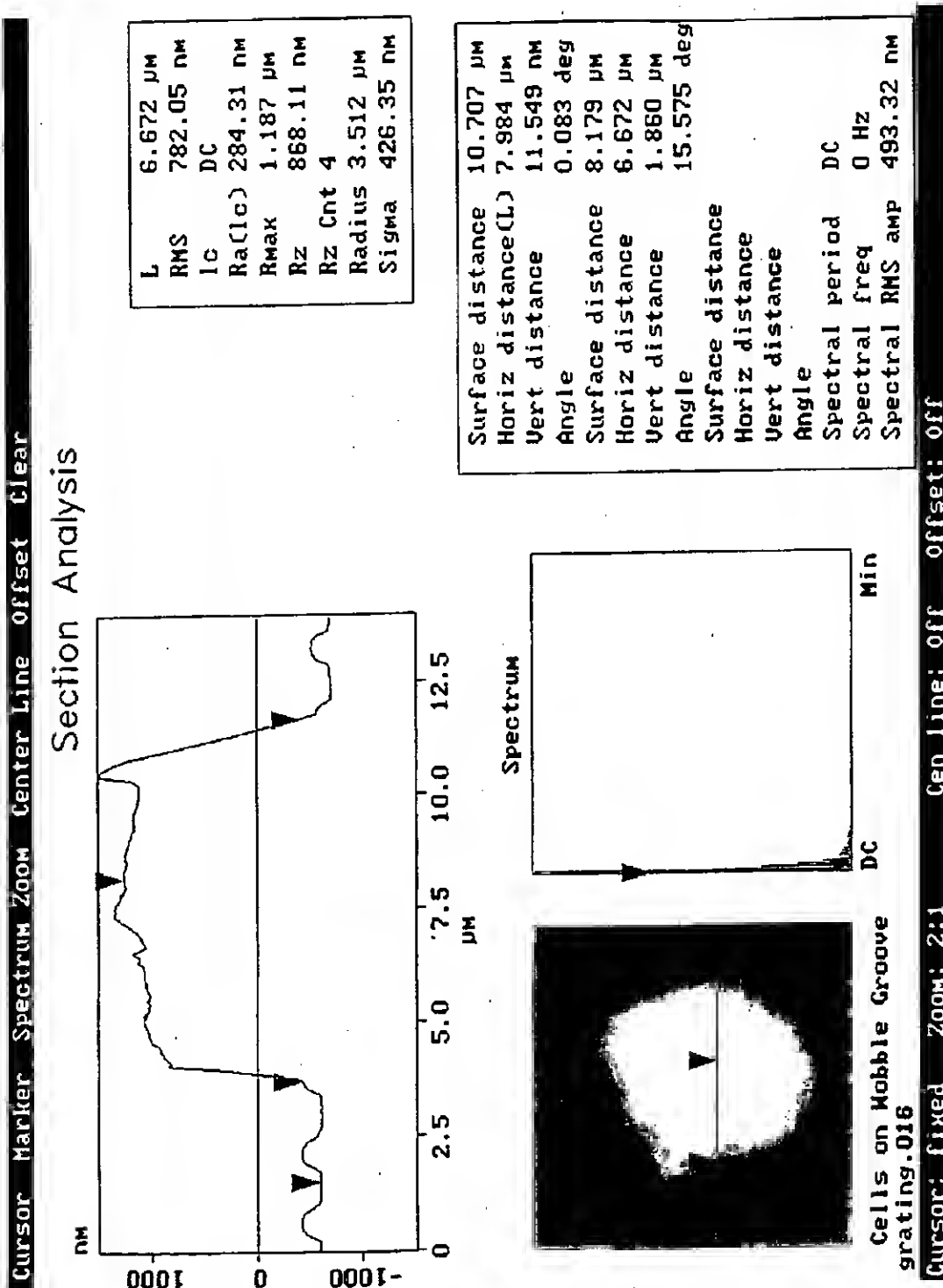
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FIG. 12



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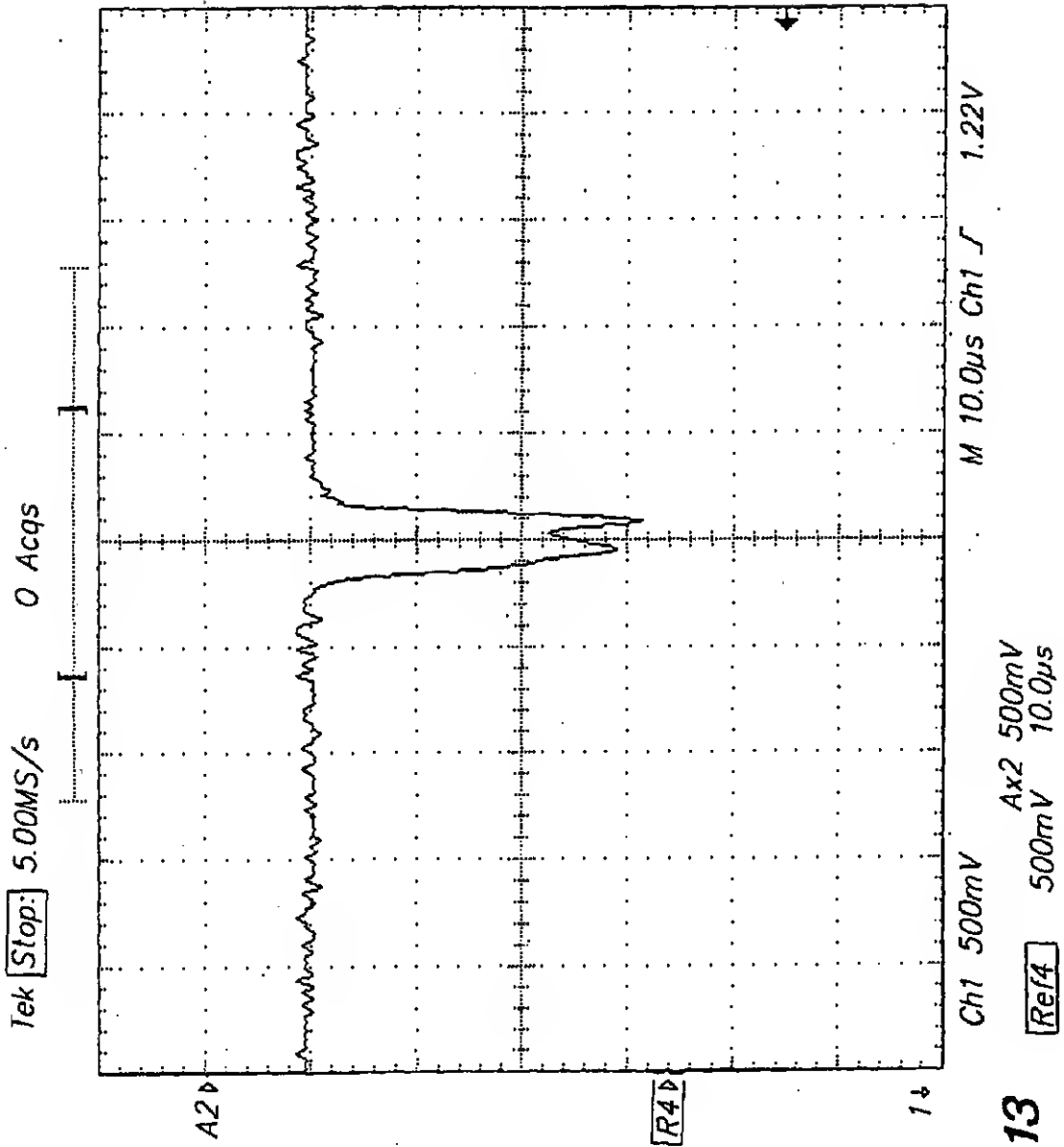


FIG. 13

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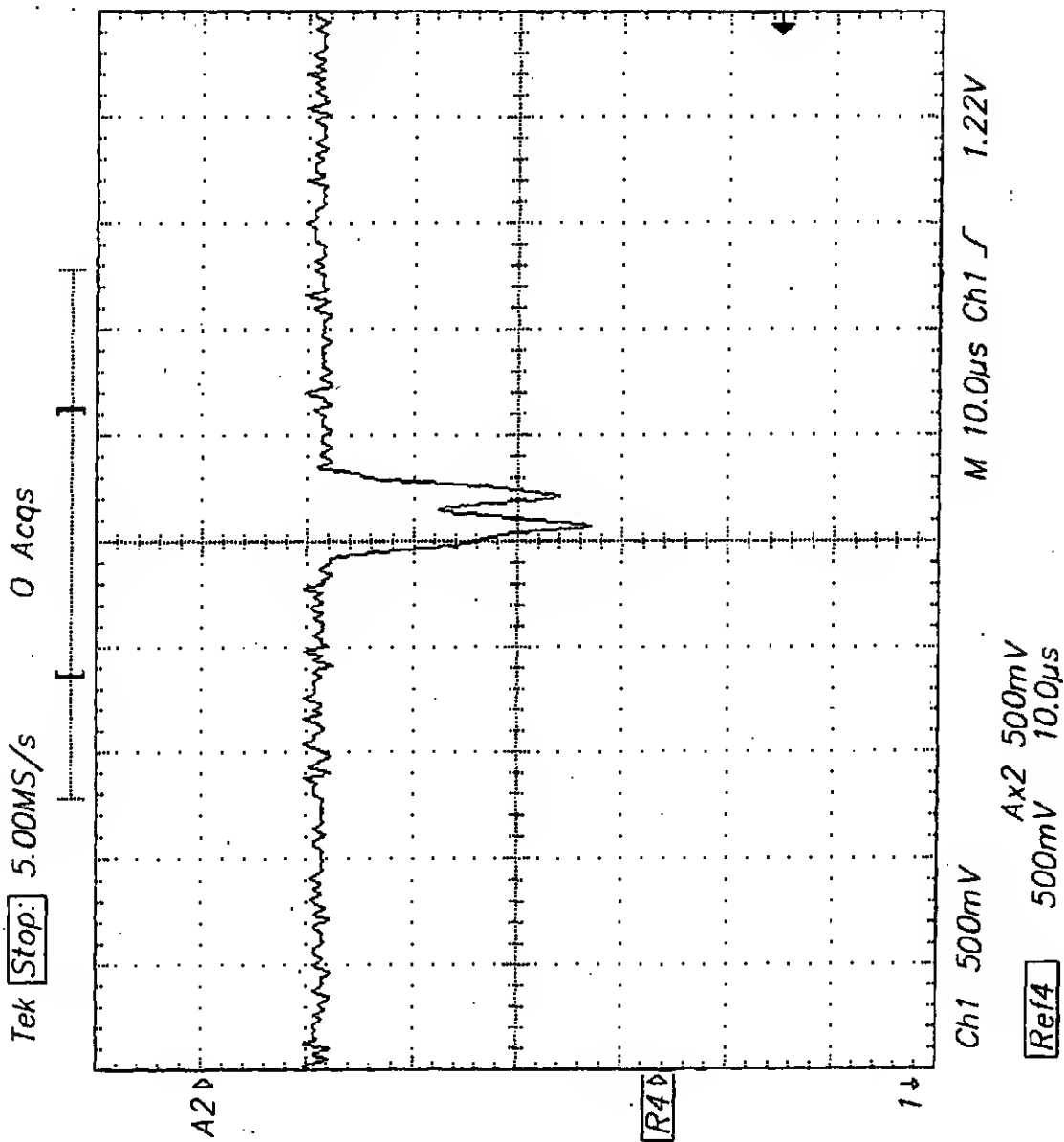
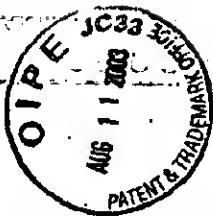


FIG. 14

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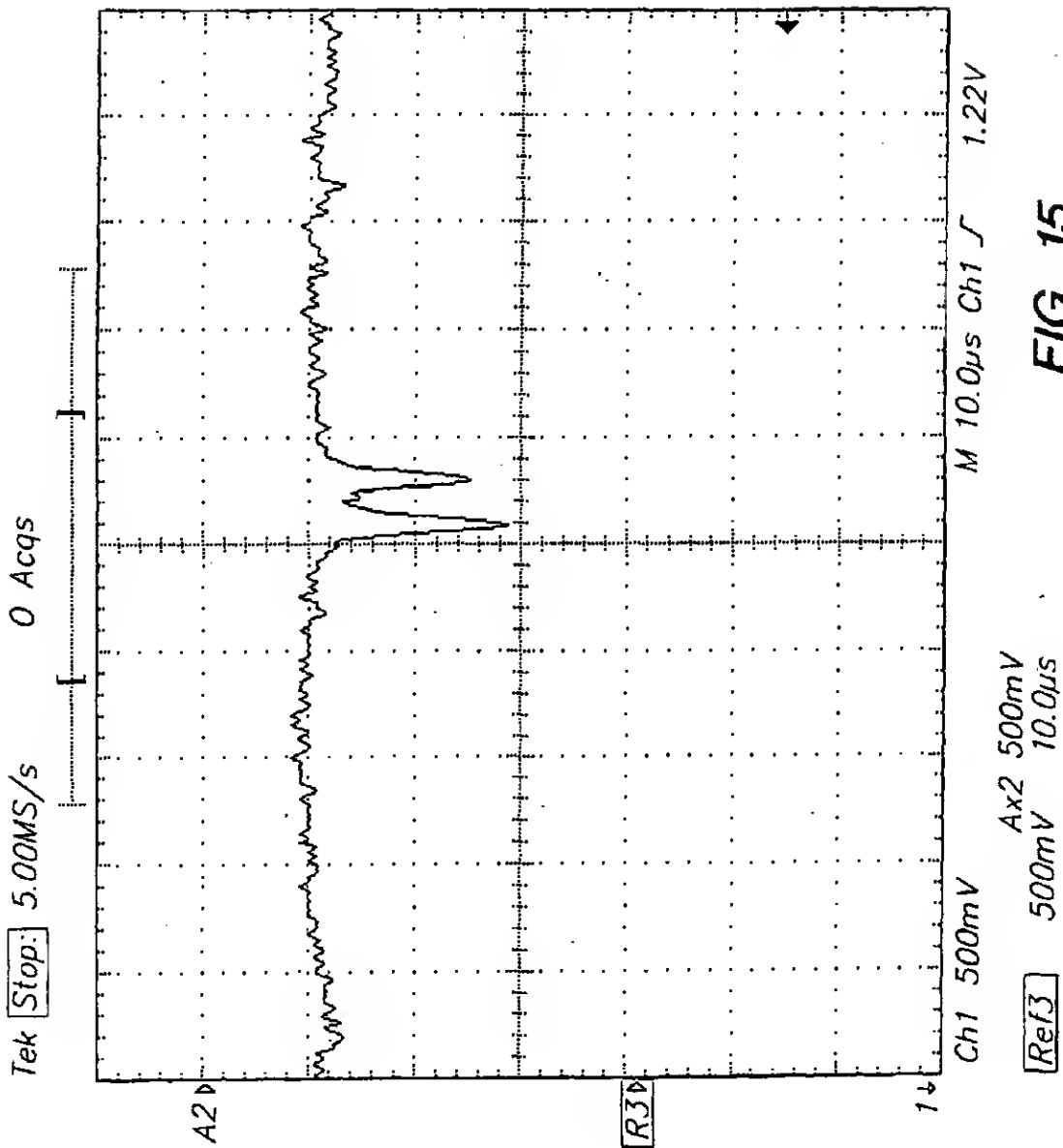


FIG. 15

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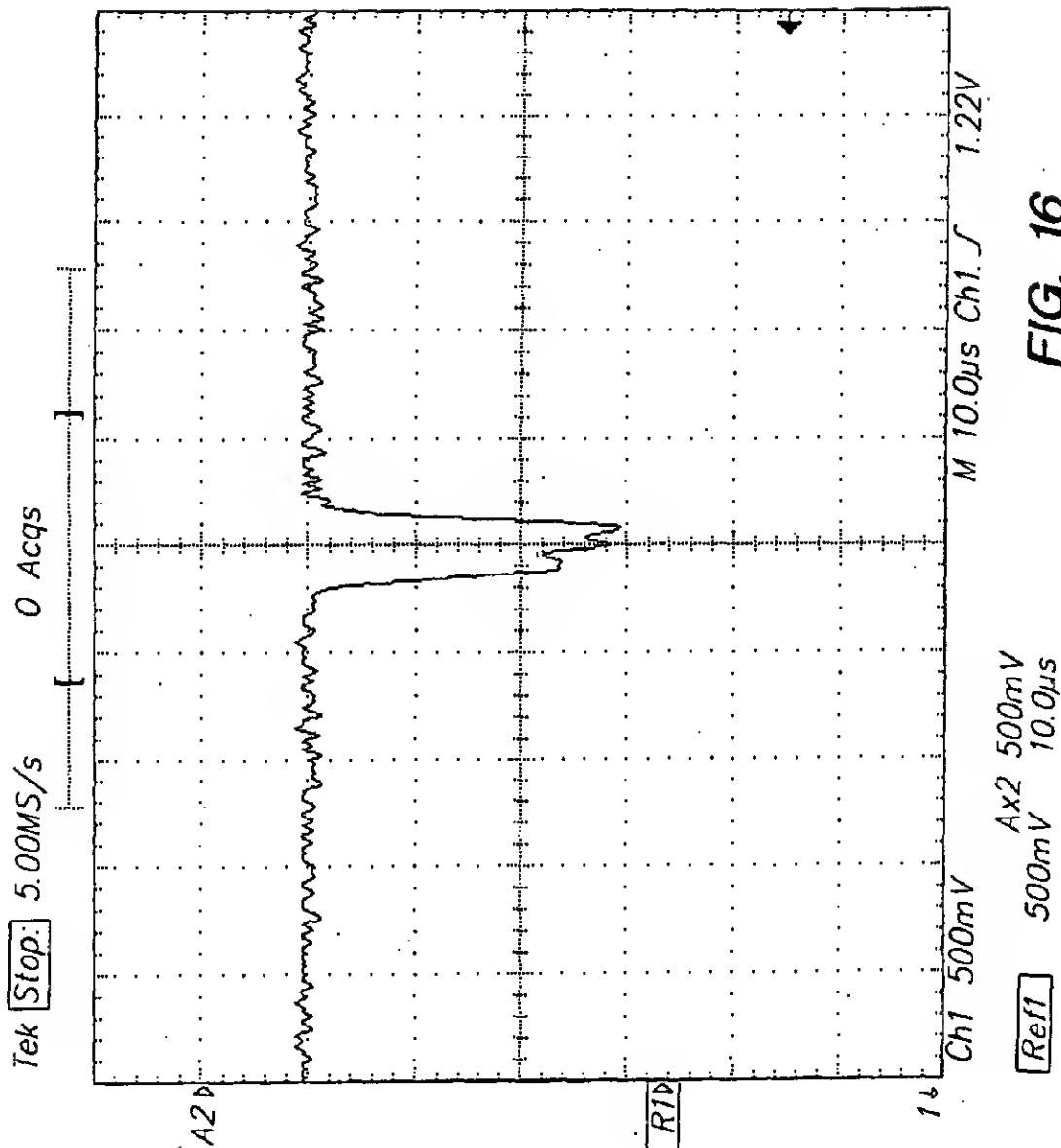
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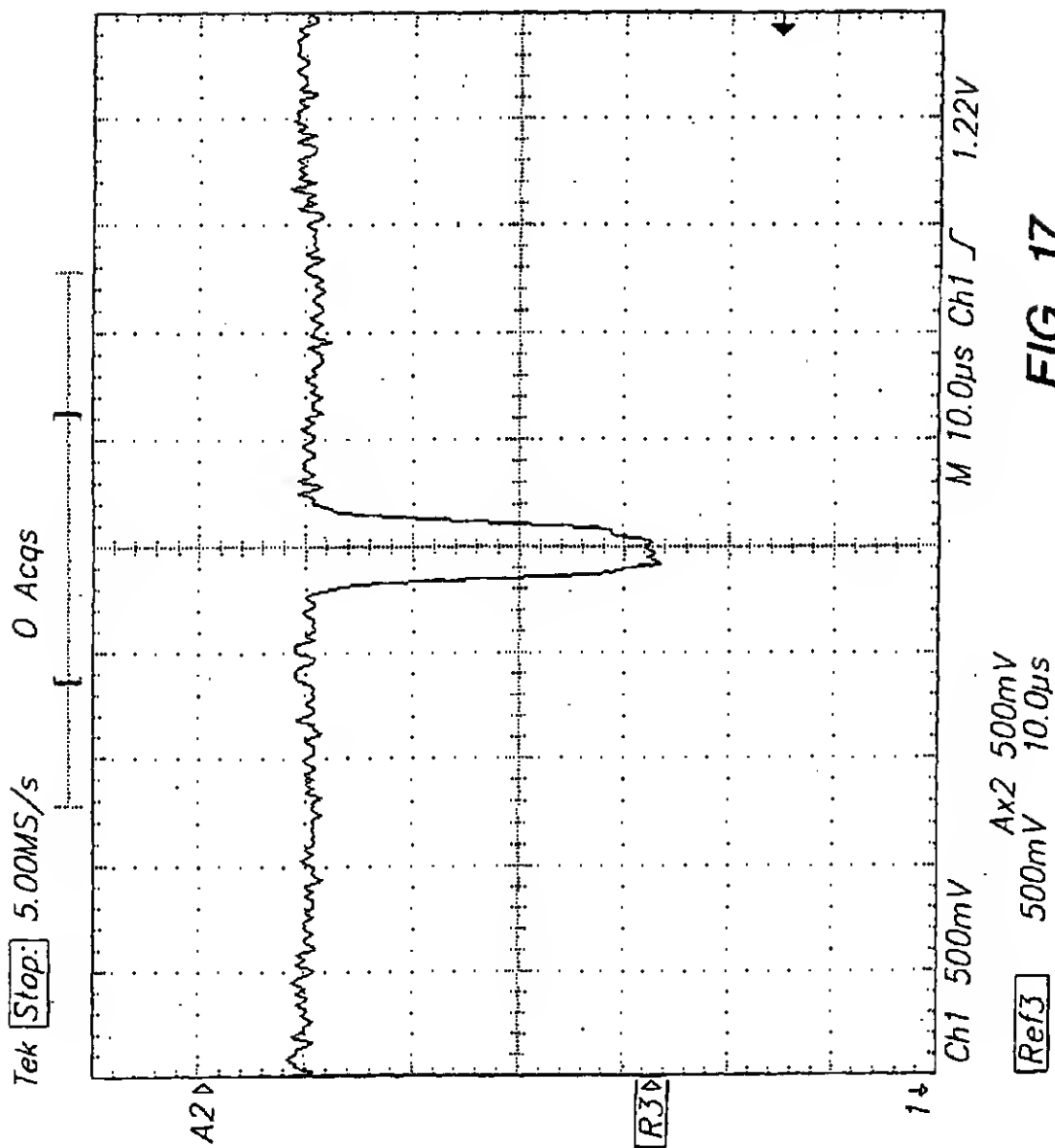


FIG. 17

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Ref4 BrstWd
5.68 μ s
Low signal
amplitude
Ref4 Pk-Pk
1.96 V

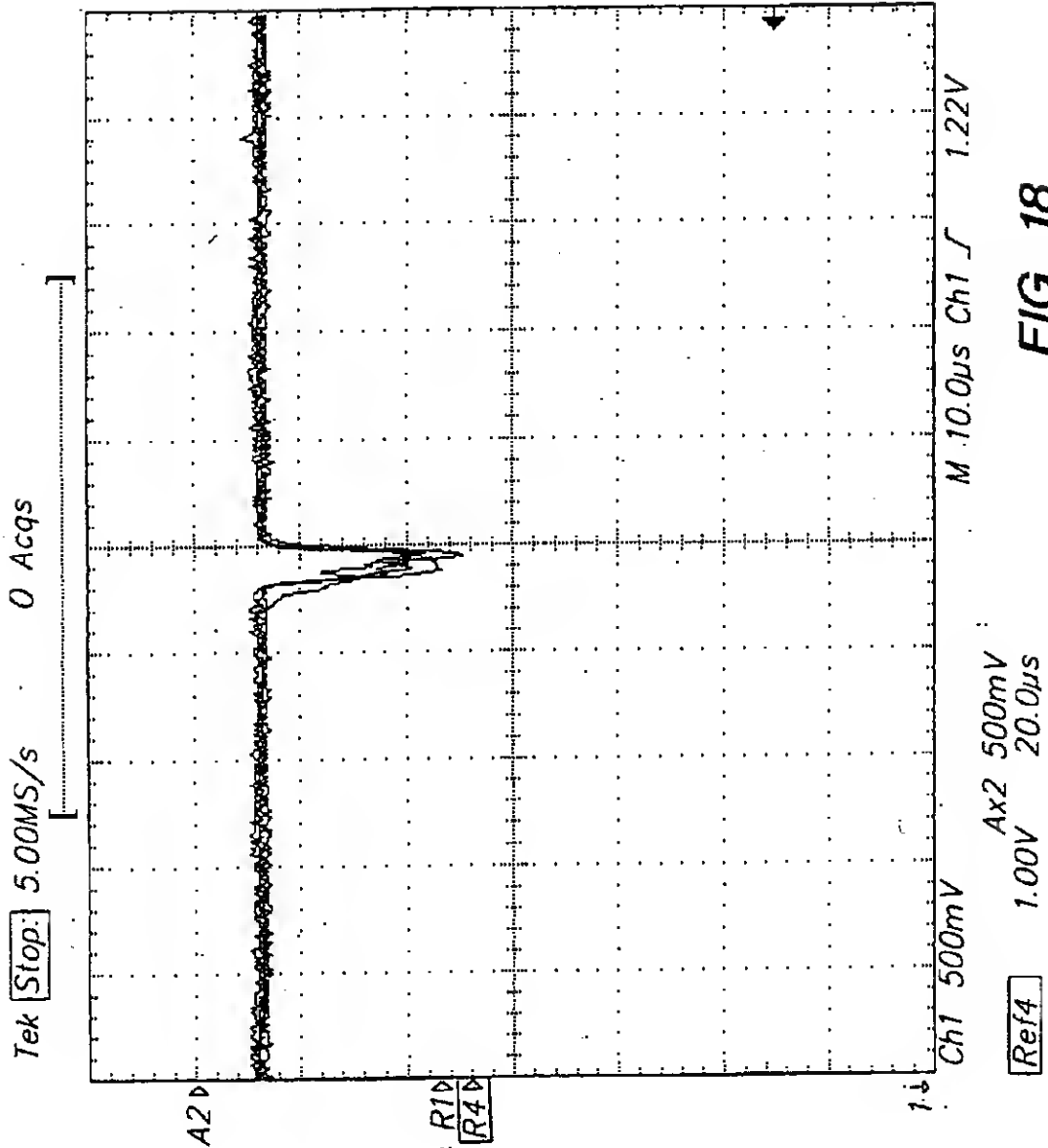


FIG. 18

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FIG. 19

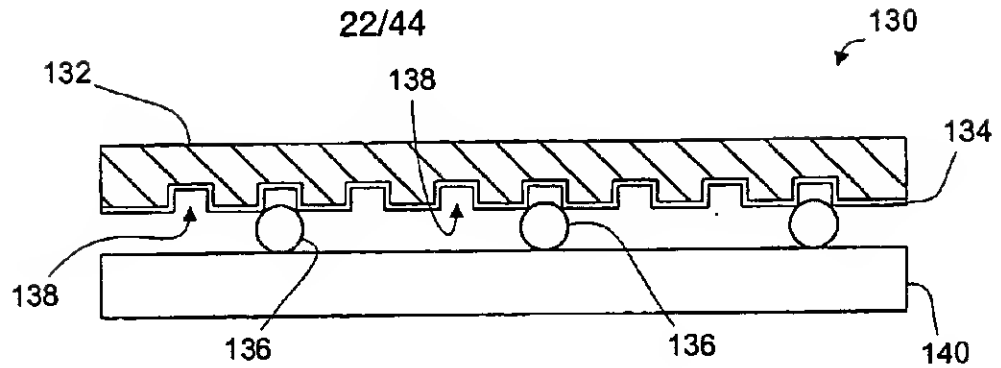


FIG. 20

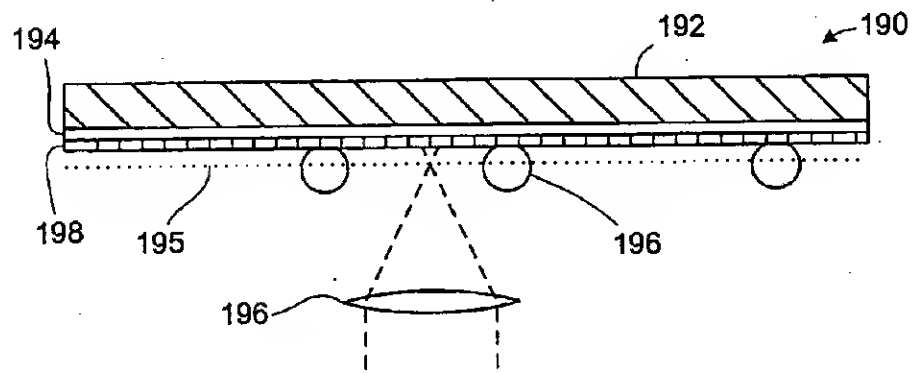
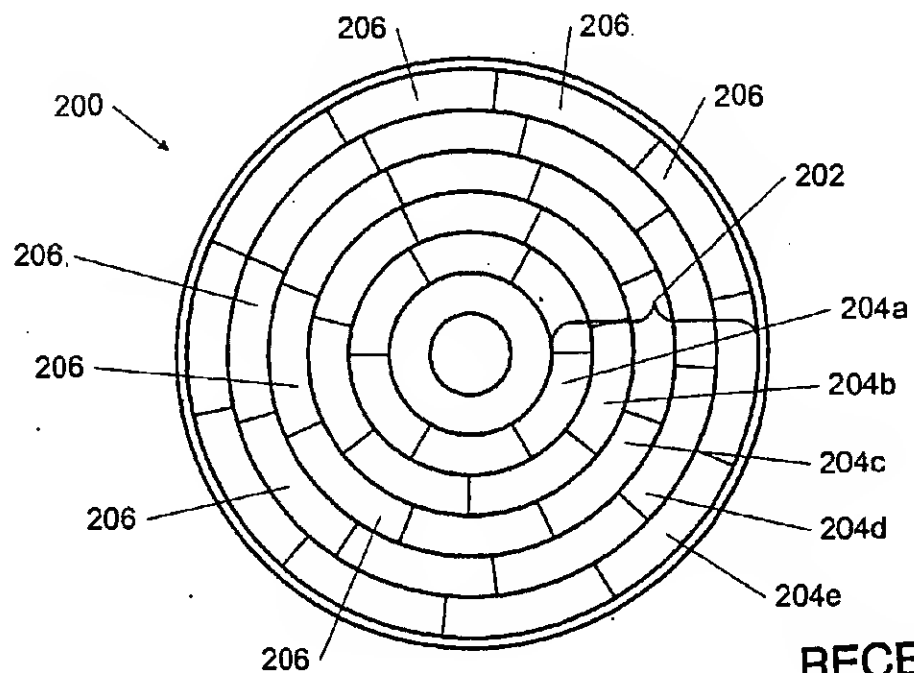


FIG. 21



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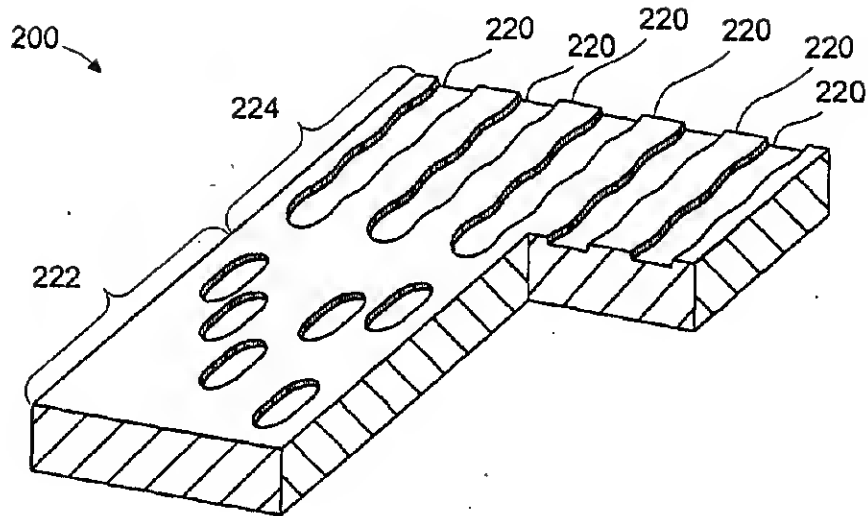


FIG. 22

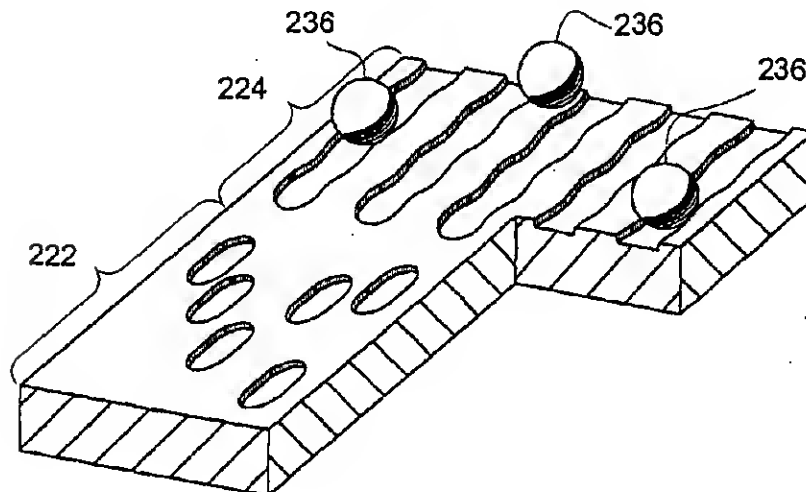


FIG. 23

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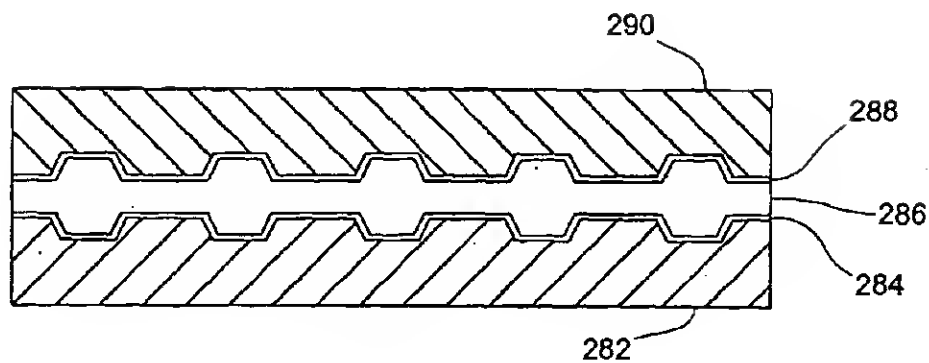


FIG. 24

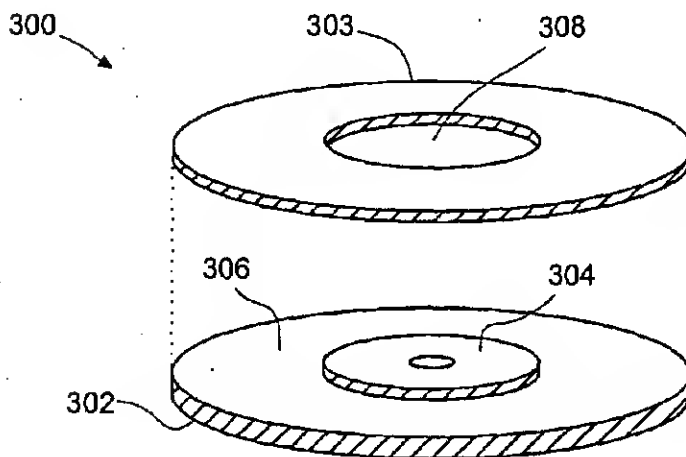


FIG. 25

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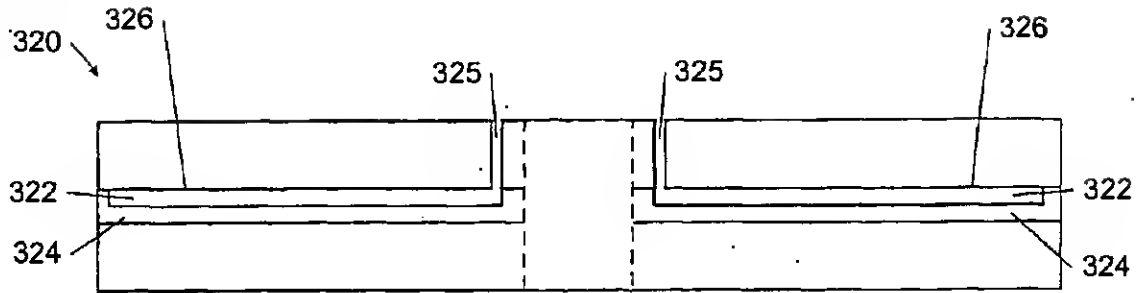


FIG. 26

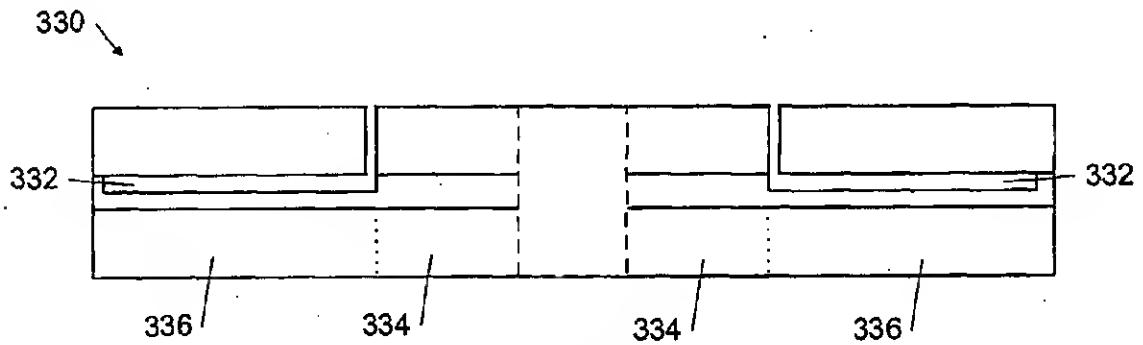


FIG. 27

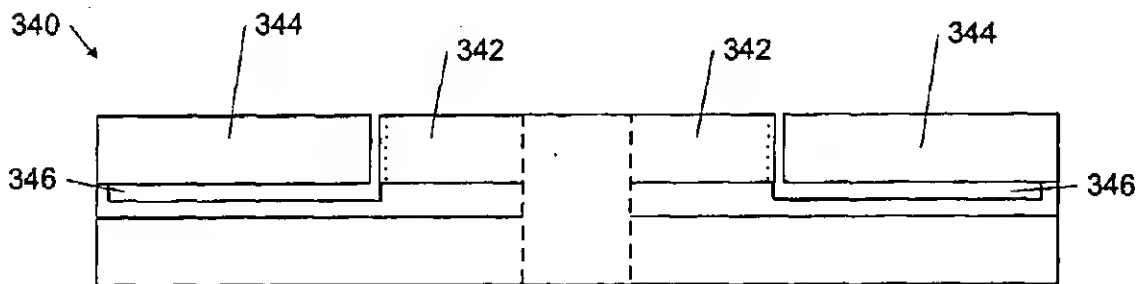


FIG. 28

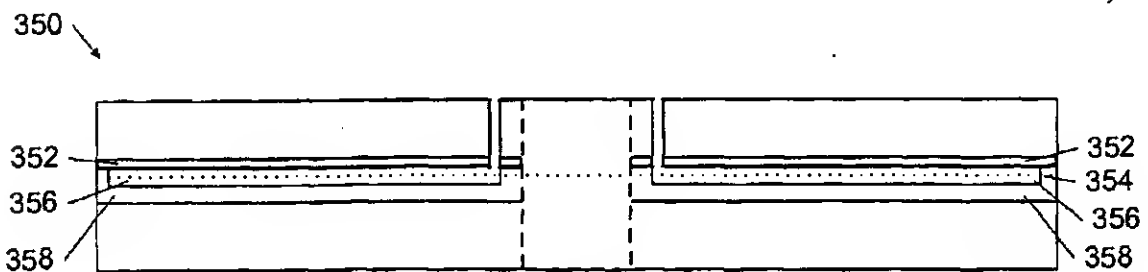


FIG. 29

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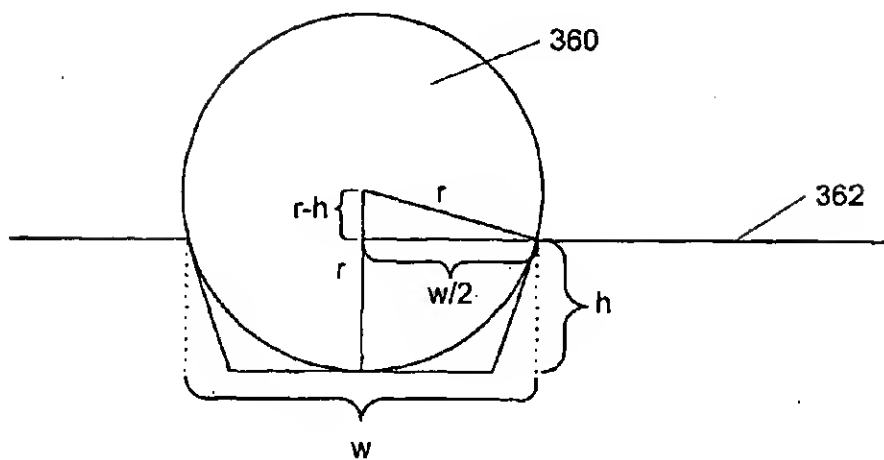


FIG. 30

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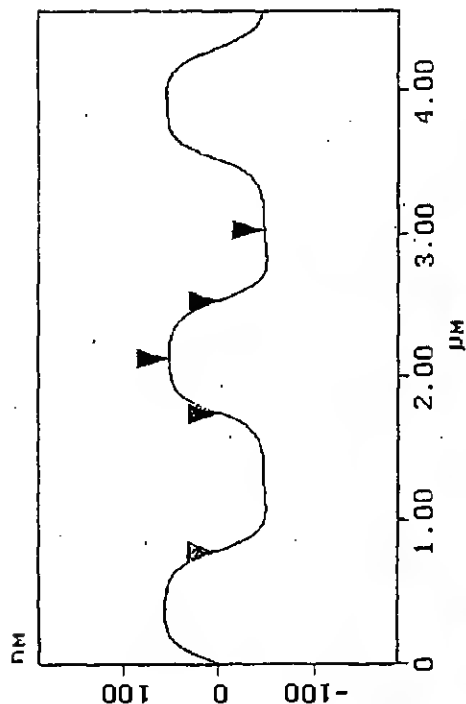
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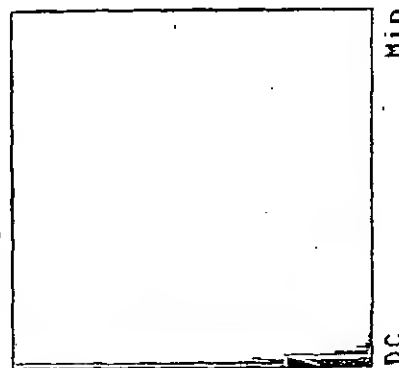
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L	800.78 nm
RMS	17.366 nm
IG	DC
Ra(Clc)	13.284 nm
Rmax	57.853 nm
Rz	57.853 nm
Rz Cnt 2	
Radius	1.427 μm
Sigma	4.388 nm

Spectrum



Surface distance	912.31 nm
Horiz distance(L)	898.44 nm
Vert distance	100.00 nm
Angle	6.351 deg
Surface distance	989.10 nm
Horiz distance	957.03 nm
Vert distance	7.528 nm
Angle	0.451 deg
Surface distance	817.07 nm
Horiz distance	800.78 nm
Vert distance	0.740 nm
Angle	0.053 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	4.523 nm

rm159in.000

Cursor: average Zoom: 2:1 Cen line: Off Offset: Off

FIG. 31

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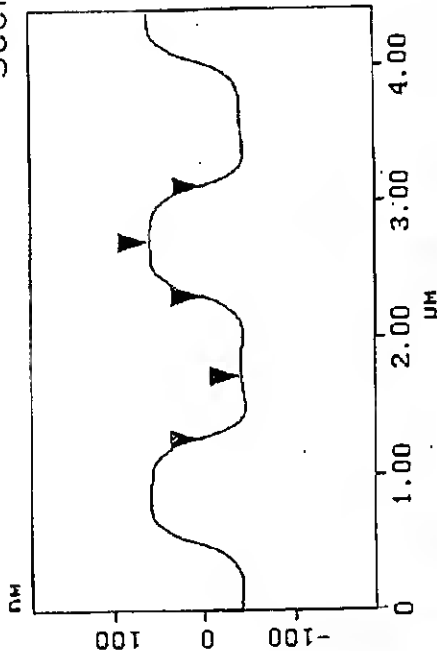
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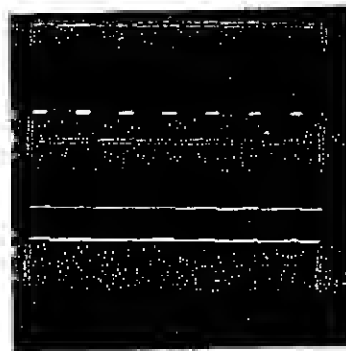
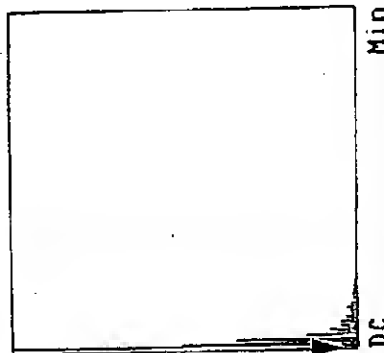


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Section Analysis



Spectrum



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Cursor: average Zoom: 2:1 Cen line: off Offset: off

L	820.31 nm
RMS	18.016 nm
IC	DC
Ra(1c)	13.505 nm
Rmax	62.560 nm
Rz	61.145 nm
Rz Cnt 2	
Radius	1.431 μm
Sigma	5.174 nm

Surface distance	991.89 nm
Horiz distance(L)	976.56 nm
Vert distance	101.23 nm
Angle	5.918 deg
Surface distance	1.050 μm
Horiz distance	1.035 μm
Vert distance	7.648 nm
Angle	0.423 deg
Surface distance	840.65 nm
Horiz distance	820.31 nm
Vert distance	3.315 nm
Angle	0.232 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	1.189 nm

FIG. 32

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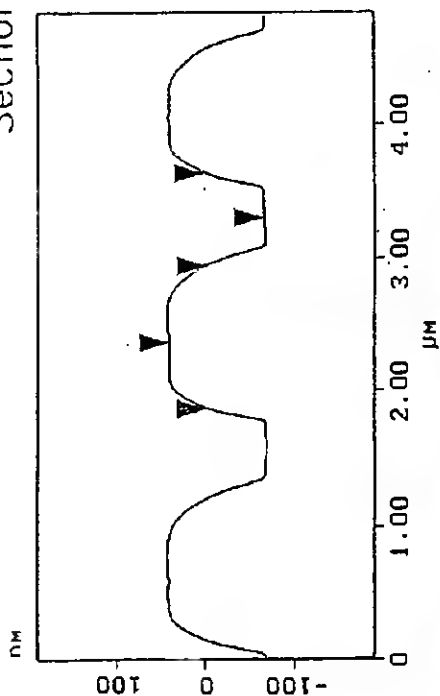
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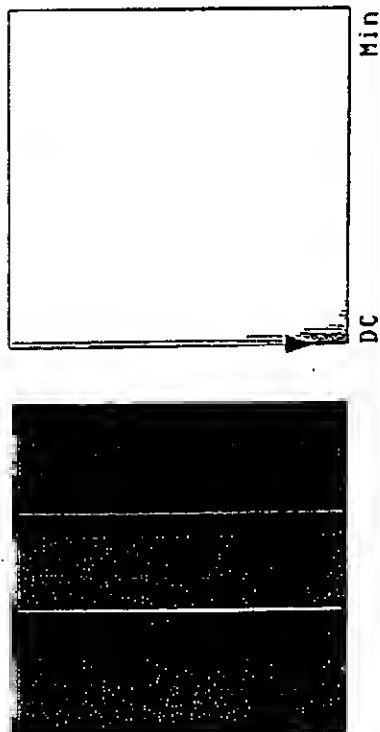
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Section Analysis



L	683.59 nm
RMS	21.794 nm
lc	DC
Ra(lc)	16.951 nm
Rmax	67.772 nm
Rz	66.682 nm
Rz Cnt 2	
Radius	820.71 nm
Sigma	8.514 nm

Spectrum



Surface distance	956.26 nm
Horiz distance(L)	937.50 nm
Vert distance	107.52 nm
Angle	6.543 deg
Surface distance	1.084 μm
Horiz distance	1.074 μm
Vert distance	4.127 nm
Angle	0.220 deg
Surface distance	715.65 nm
Horiz distance	683.59 nm
Vert distance	3.943 nm
Angle	0.330 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	3.603 nm

Cursor: average Zoom: 2:1 Gen line: off Offset: off

FIG. 33

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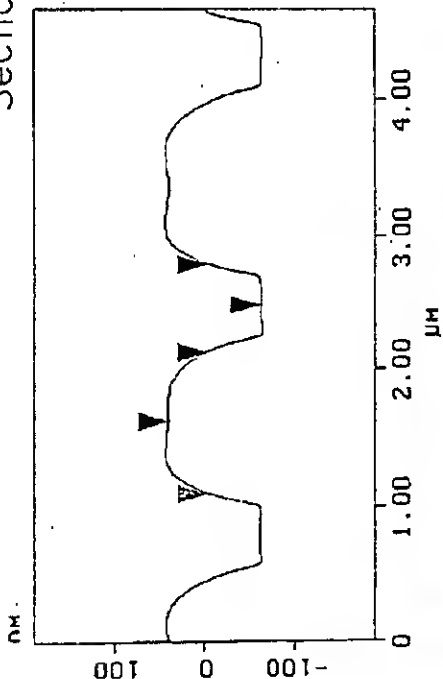
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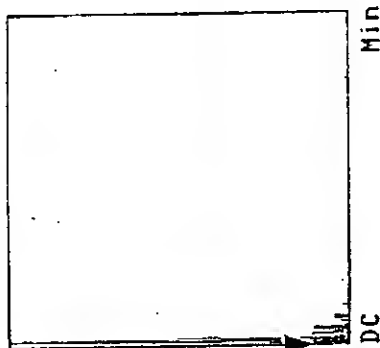
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Section Analysis



L	684.06 nm
RMS	20.135 nm
Ic	DC
Ra(Ic)	14.972 nm
Rmax	66.116 nm
Rz	64.871 nm
Rz Cnt	2
Radius	824.44 nm
Sigma	8.988 nm

Spectrum



Surface distance	878.62 nm
Horiz distance(L)	859.38 nm
Vert distance	102.80 nm
Angle	6.821 deg
Surface distance	1.046 um
Horiz distance	1.035 um
Vert distance	4.540 nm
Angle	0.251 deg
Surface distance	695.52 nm
Horiz distance	664.06 nm
Vert distance	2.814 nm
Angle	0.243 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	3.340 nm

ml60out.000

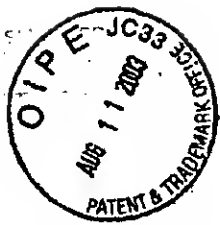
Cursor: average Zoom: 2:1 Cen line: off Offset: off

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FIG. 34

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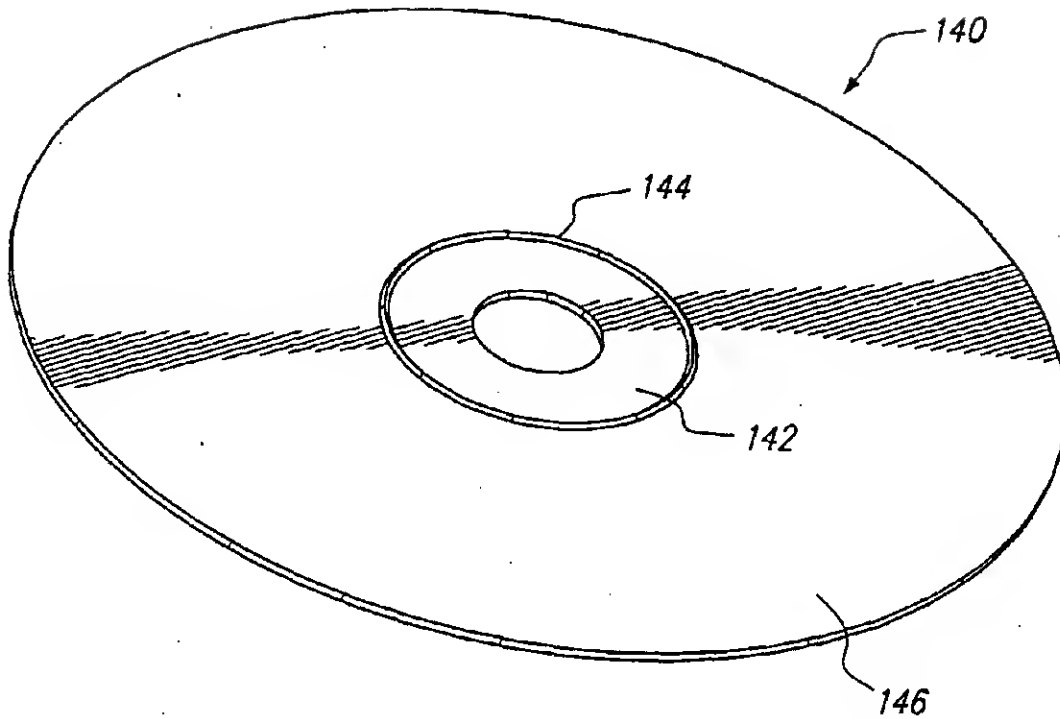


FIG. 35

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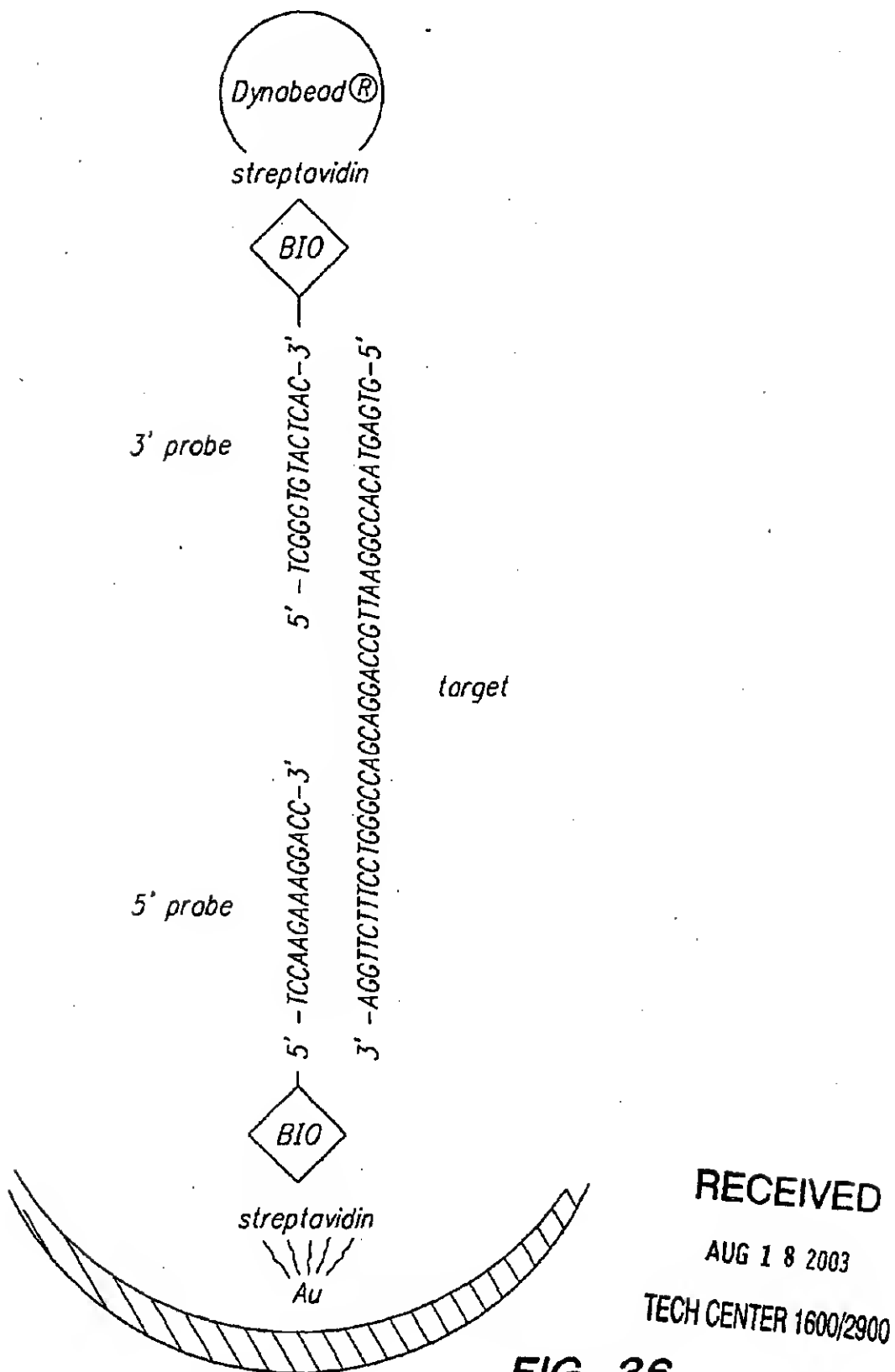
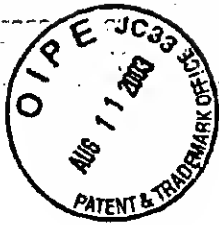


FIG. 36

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FIG. 37A

20 femtomoles

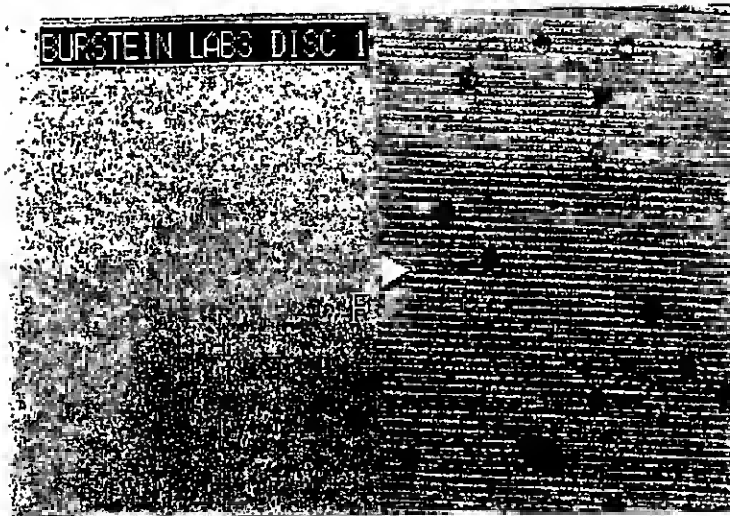


FIG. 37B

20 attomoles

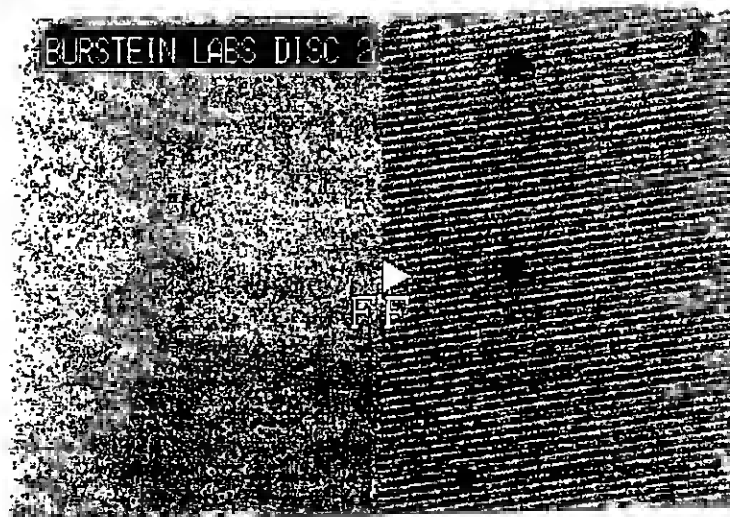
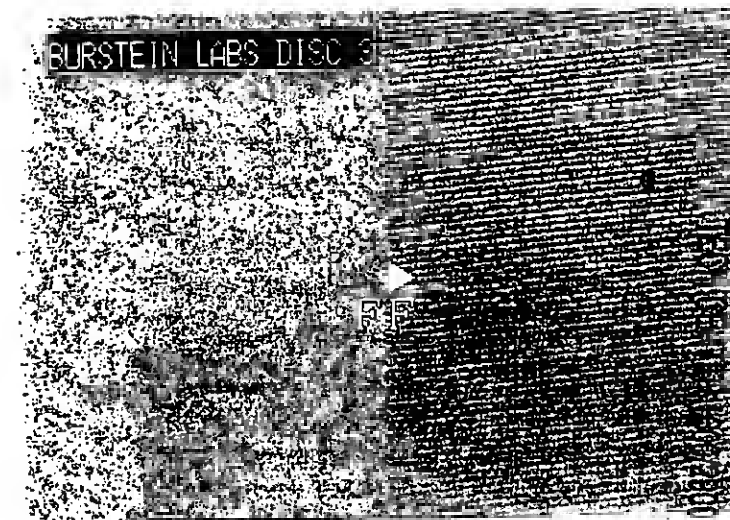


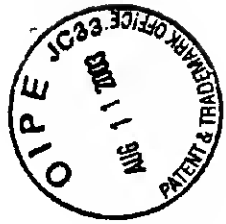
FIG. 37C

20 zeptomoles



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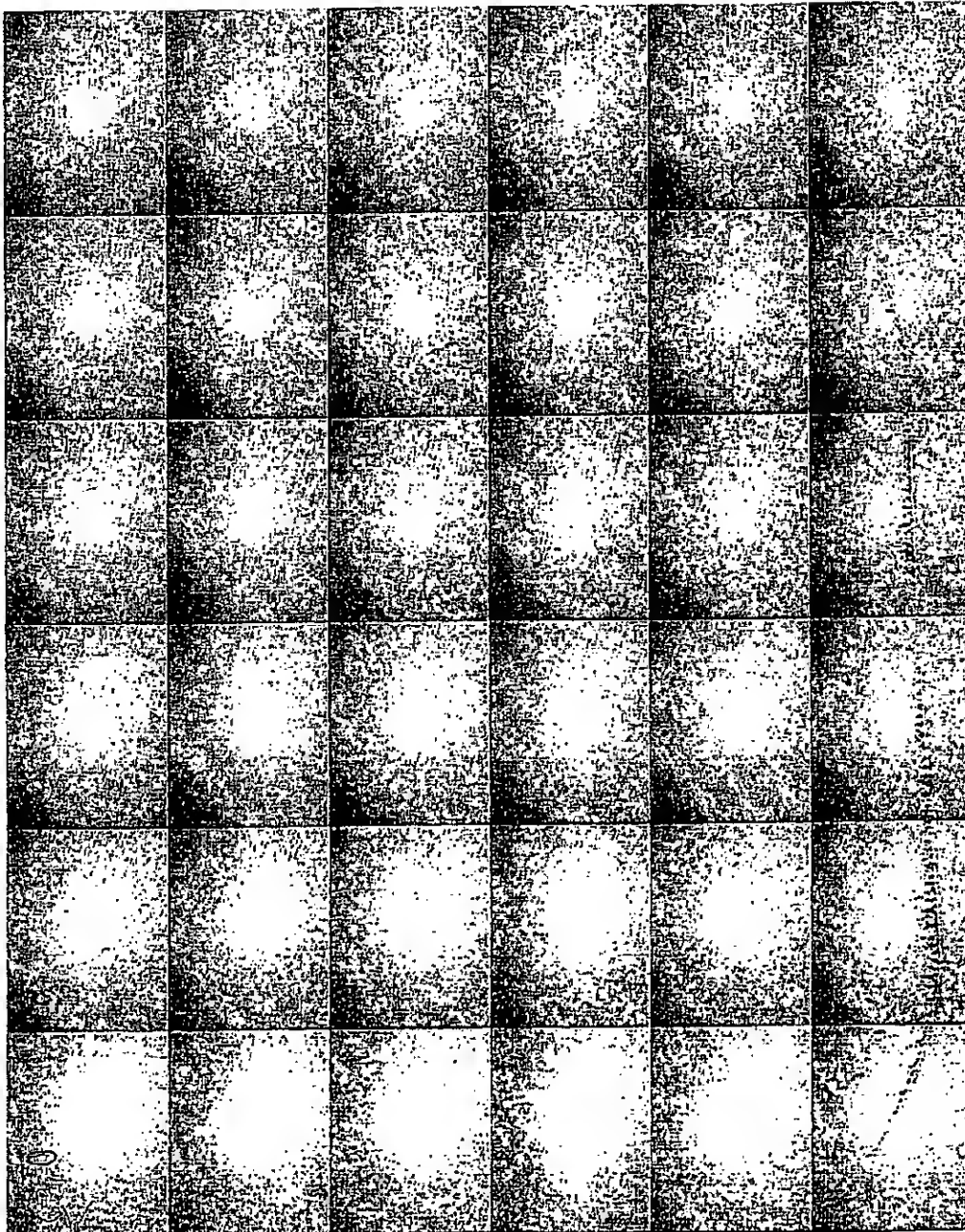
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FIG. 38



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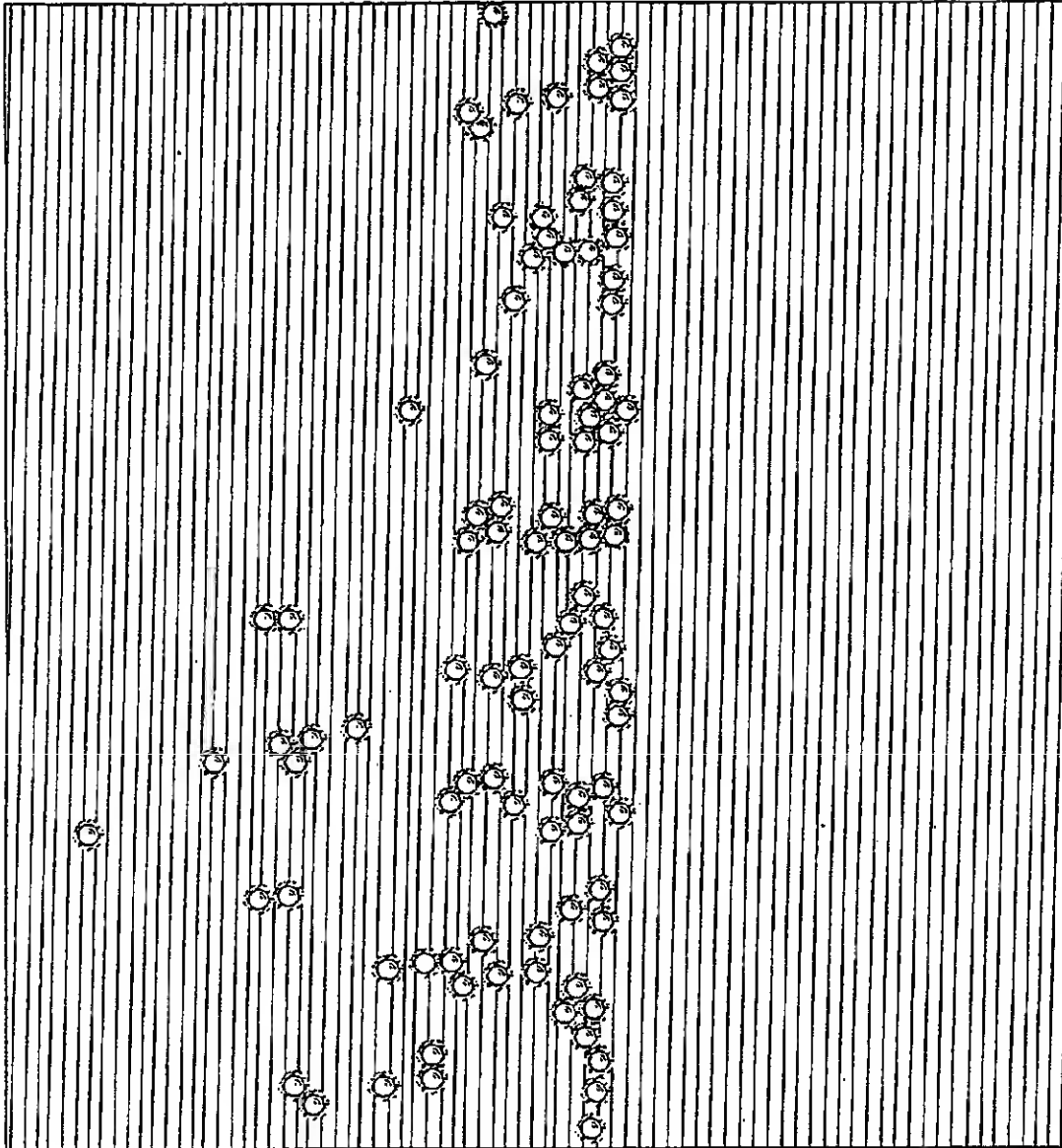


FIG. 39

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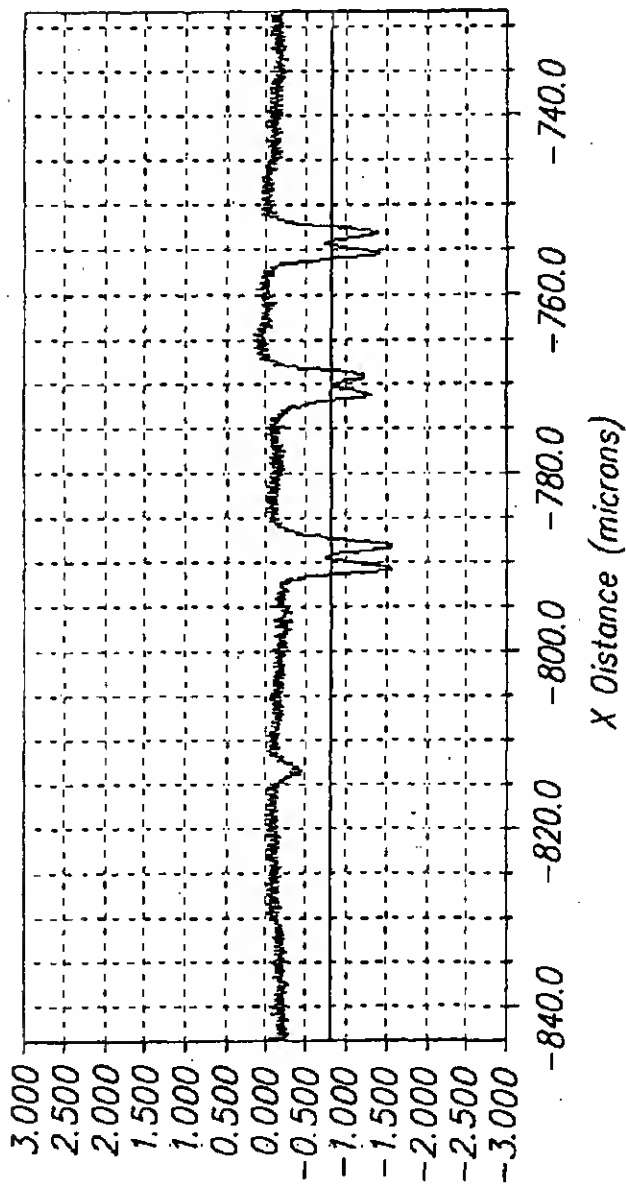


FIG. 40

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AWM Muri		Supplementary sheet, mold acceptance test				CD-3-AWM	
Job No	36-10236	Agent	CR-R	Ram hold	vac + mech	IFPI	-
SM Order No	9N.96293	Customer	Eximpo CS	Ram dia.	24	Product Code No.	256

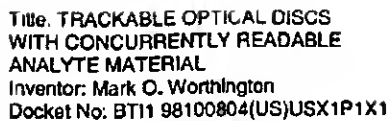
Dimensions	0"=mold ot top	0'	90'	180'	270'	Visual faults	1/4 Center hole	✓
Thickness	R15	1.15	1.155	1.15	1.15	Streaks	1/4 Stacking groove	✓
	R40	1.155	1.155	1.155	1.155		1/4 Info	✓
Center hole	15.05+/-0.3	15.05	Drm.	120+/-0.3	mm		1/2	✓
Weight in g	Min	0	15	30	45	Clouds	1	✓
Measure every 15 min. during test	g	15.26	15.27	15.26	15.26	Voids	3	✓
Max. diff±0.1 g	g	15.26	15.26	15.26	15.26	Black dots	3	✓
						Mott outer edge	3	✓
						Burrs	3	✓
Water in mold	ACTUAL	DESIRED	Tol.				Center hole	✓
Sprue bush	9	ltr./Min.	7	-1/+3		Scratches	Outer Edge	✓
Emboss	6	ltr./MIN.	7	-1/+3		Diesel effect		✓
						Brown Discoloration		✓
Vacuum		without with	diff.	tol.				✓
Hondling	bor							✓
Ram	bor							✓
Mold Function		Raw material						✓
Emboss	✓	Mokrolon 2005	✓			Molding compound cold		✓
Sprue ejector	✓	Lexon 1020				Thickness of cavity (3)	1.462	✓
Ejector sleeve	✓	Ponlite 5503				Venting gap (5)	0.33	✓
Sprue bush	✓					Position of embosser (9)	0.876	✓
						Position of spure bush (10)	0.162	✓
						Embossing stroke	0.7	✓
Air outlet								✓
FS dio.	✓					Measuring means		✓
BS dio.	✓					Polarized light		✓
						Hologen light		✓
						Neon Light		✓
						Block (UV Light)		✓
						White poper		✓
						Micrometer		✓
						Balance		✓

FIG. 41A

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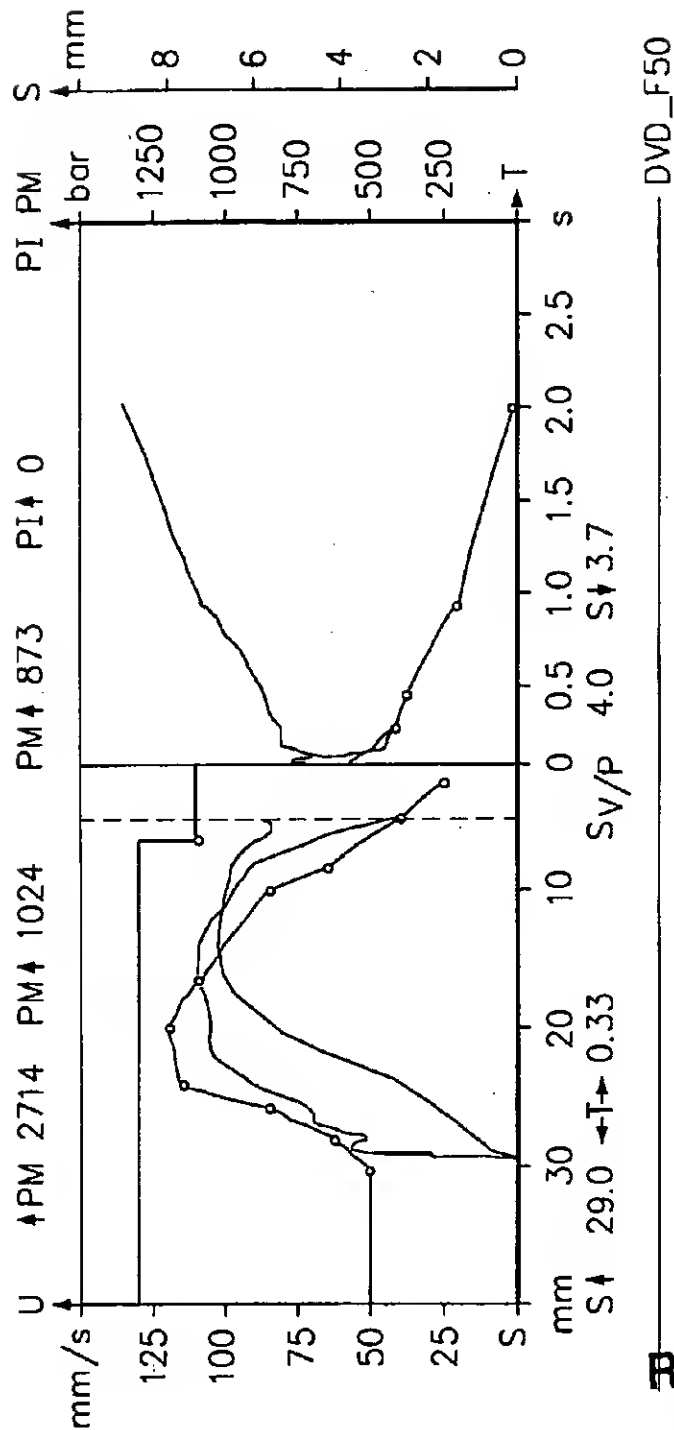
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Graph 1. Injection - Holding pressure

Cycle illustrated: 533957

Curve display: continuous



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FIG. 41B



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01.01 Mold movement

Closing movement T32 = 000.

V33 = 100% Closing time S33 = 019.0mm
V34 = 100% S34 = 000.7mm

Opening movement T36 = 000.
V41 = 100% Opening time S41 = 055.0mm
V42 = 010%

Pause time T40 = 000.000s Mold position S640 = 075.

Mold closing pressures
Closing pressure P682 = 085%
Pressure Build-up P681 = 020%
T681 = 000.10s

C608 = 0 Switched off

02.01 Summary of mold auxiliary controls/robotics

Enable removal T680 = 0065.0

Delays

Blow off sprue T602 = 000.03 Sprue blowing time T603 = 000.1

Advance ejector pin T53 = 000.10s

Transfer stroke forward T55 = 000.12s

Transfer Stroke return T56 = 000.15s

Embosses forward T62 = 001.20s

Blow on nozzle side T75 = 000.50s

Blow on moving side T671 = 000.00

Unit Forward T680 = 000.70s

Starting program C683 = 00000

Cycle time T11 = 009.05s

Removal time T640 = 000.70s

Extend removal T668 = 000.2
Embosses return T63 = 000.1
Nozzle side blowing time T74 = 000.8
Moving side blowing time T71 = 000.1

T683 = 000.00s S683 = 0004.

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FIG. 41C



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FIG. 41D

03.01 Metering									
Screw retraction	C17 = 0	Switched off							
Metering Delay	T20 = 000.50 s								
Metering stoges	C124 = 2								
Metering end point	S23 = 026.0 mm	P23 = 0060 bar	N23 = 100 1.						
	S24 = 029.0 mm	P24 = 0010 bar	N24 = 020 1.						
Holding pressure	P27 = 0010 bar	Start of injection	S0 = 029.0						
04.01 Injection									
Enable injection	S682 = 0002.0 mm	Screw position	S641 = 029.0						
Injection values	C121 = 10	Start of injection	S0 = 029.0						
	V196 = 0050 mm/s	S196 = 030.0 mm							
	V197 = 0062 mm/s	S197 = 027.6 mm							
	V198 = 0085 mm/s	S198 = 025.6 mm							
	V199 = 0115 mm/s	S199 = 024.0 mm							
	V200 = 0120 mm/s	S200 = 019.8 mm							
	V201 = 0110 mm/s	S201 = 016.2 mm							
	V202 = 0085 mm/s	S202 = 009.5 mm							
	V203 = 0065 mm/s	S203 = 008.0 mm							
	V204 = 0040 mm/s	S204 = 004.0 mm							
	V205 = 0025 mm/s	S205 = 001.5 mm	T2 = 000.3						
Enable V/P changeover		V/P changeover point	S11 = 004.0						
Forcible changeover									
Flow number	S121 = 018.2 mm	S122 = 015.0 mm	C125 = 2776						
Pressure monitoring		Peak pressure	P125 = 01044						
First stage	P101 = 01300 bar	T201 = 00.02 s							
Second stage	P102 = 01100 bar	T201 = 00.02 s	S102 = 006.0						

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FIG. 41E

04.02 Holding pressure, cooling				
Holding pressure values	C122 = 04 P12 = 00550 bar	Changeover point	S11 =	004.0
	P117 = 00420 bar	T117 =		000.20
	P118 = 00380 bar	T118 =		000.40
	P119 = 00200 bar	T119 =		000.90
	T39 = 005.30 s	T120 =		002.00
Holding pressure time				
Cooling time				
Melt cushion monitoring		Melt cushion	S19 =	003.7
Upper limit	S219 = 010.0 MM	Lower limit	S119 =	000.5
05.01 Nozzles, unit, purging/dry cycles				
Standstill monitoring	C606 = 60 min	C640 =		0004 min
Unit				
Unit forward	T680 = 000.70 s	V29 =		030 %
Lift	T30 = 000.30 s	V30 =		050 %
Unit set-up and manual movements				
Move forward	V816 = 030 %	Lift V806 =		030 %
Purge/dry cycle/clean				
Number of metering strokes	C16 = 20	C201 =		50
Metering	S16 = 028.0 mm	P16 =		0060 bar
Injection	S18 = 001.5 mm	V101 =		05 mm/s
Delay for purging	T606 = 000.00 s	N16 =		200

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FIG. 41F

06.01 Temperature control, plastifier zones/temperature control devices

Zone/description	Set point	Actual value	Reduced Tolerance		Heating outputs	Cooling
			minus	plus		
10 Melt temperature	310° C	305° C	180° C	040° C	040° C	
30 Nozzle	330° C	330° C	180° C	040° C	014%	
13 Nozzle	315° C	315° C	180° C	040° C	025%	
Cylinder head	310° C	310° C	180° C	040° C	008%	
15 Compression	305° C	305° C	180° C	040° C	005%	
16 Compression	305° C	308° C	180° C	040° C	006%	
18 Feed	300° C	295° C	180° C	040° C	070%	
20 Inlet	060° C	060° C	060° C	040° C	040° C	024

Zone/description	Set point	Actual value	Reduced Tolerance		Heating outputs	Cooling
			minus	plus		
24 Heating/cooling device	112° C	093° C	050° C	020° C	020° C	000
25 Heating/cooling device	114° C	091° C	050° C	040° C	020° C	000

08.01 Disk transfer

Peripheral interface	C684 =	0	Without signal acknowledgement	
Buffer switch-off size	C680 =	65000		
Production delay	T682 =	001.00 s		
Max. transfer time	1091	001.00 s		

With interruption of cycle

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FIG. 41G

09.01 Production control									
Application	C340 = 2		No application						
Data set number	C315 = 100								
Production sequence									
Item number	C303 = 1		Piece counter	C324 = 29270					
Cycle time	T11 = 009.05 s		Cycle counter	C325 = 29270					
Production preparation			Foailure rate	C718 = 30.56%					
			Reason	C357 = 00					
10.01 Process statistics									
Q monitoring	C340 = 2		Monitoring without screening out						
Q report	C700 = 0		No report						
Total	cycles of which		out of tolerance	foilure rate					
Random sample	C325 = 29270		C318 = 8946	C718 = 30.56%					
	C326 = 29269		C338 = 8946	C738 = 30.56%					
Process variables	Set Point	Tolerance	Actual Value	Mean	Scotter	Out of Tolerance			
	x	+/-	x	xq	3s				
Metering time	1.20	0.30	5.98 s	2.32	5.408	-06786			
Injection start	30.1	2.0	29.0 mm	28.6	0.82	2028			
Injection time	0.47	0.20	0.33s	0.39	0.105	0			
V/P chongeoover point	3.5	1.0	4.0 mm	4.0	0.04	0			
Melt cushion	4.2	1.0	3.7 mm	3.8	0.25	0			
? peak value	600	200	871 bar	682	99.9	-06566			
? peak value	0		0 bar	0	0.0				
Flow number	2500	300	2776	2441	99.9	359			
Cycle time	3.90	0.50	9.05 s	5.08	6.421	-06570			

FIG

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10.02 Configuration of the quality

Reaction: Process data -outside tolerance
Switch-off behavior C703=0 no reaction

10.03 Q report intermediate store

Manufacturer
Machine No. DVD_F50
Job data

FIG. 41H

16.01 System characteristics

Machine data	DISCJET 600/110	Order number	DVD_F50
Machine type	PAC 13.54	IMC 12.26	CEL 10.31
Control version	D8 05.80	Date created	23.10.1996
Database version	350400	Version	17106
Mold data	S90 = 160 mm		
Plasticizing	Identification	C806 =	024
Ram nominal diameter	S801 =	032.0 mm	
Max. permissible melt pressure	P800=	01482 bar	
Max. permissible backpressure	P801 =	0317 bar	
Temperatures	Set point/actual value		
Cabinet	TH1 =	035 026° C	
Oil	TH2 =	050 051° C	
	Tolerance -/+		
	030° C	010° C	
	041° C	011° C	
	Heating		
	000%		
	Cooling		
	005		

FIG. 41I